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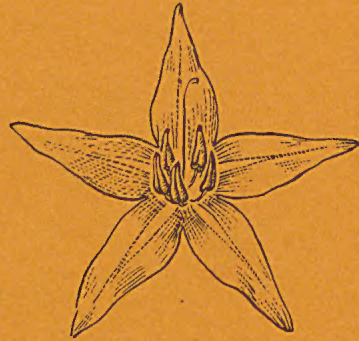
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10-30 specimens should be cited for each species (or subspecific taxon), although this may be varied under certain circumstances. The author may decide whether or not to include dates of collections and the sequence, provided a constant pattern is adhered to throughout a paper.

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A REVISION OF THE GENUS *SOLANUM* IN AUSTRALIA

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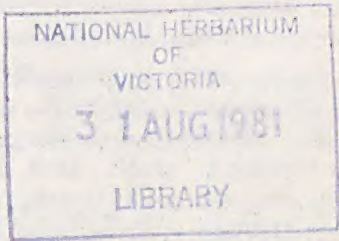
Abstract

A revision of the genus *Solanum* in Australia is presented. Ninety-four native species are recognised, including the following new species: *S. ashbyae* Symon, *S. beaugleholei* Symon, *S. chippendalei* Symon, *S. clarkiae* Symon, *S. cookii* Symon, *S. eardleyae* Symon, *S. hesperium* Symon, *S. heteropodium* Symon, *S. linearifolium* Gerasimenko ex Symon, *S. petraeum* Symon, *S. seitheae* Symon, *S. terraneum* Symon, *S. tudunungae* Symon and *S. yirrkalensis* Symon.

The new combination, *S. plicatile* (S. Moore) Symon, is made.

Thirty-one alien species are established or are important in Australia.

The main part of the work is devoted to a description of each species, with synonyms being listed. Maps of distribution and illustrations of almost all species, comprising a leafy branch, anthers, gynoecium and a fruit cluster are provided.



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Introduction

Solanum is a large and varied genus containing almost 75% of the species in the family Solanaceae. It is cosmopolitan in distribution but is found chiefly in the tropical and warm temperate areas of the world. It is best developed in the Southern Hemisphere, particularly in South America, with other centres of speciation in Australia and Africa; Europe and Asia are not rich in species.

The genus *Solanum* contains many important agricultural, horticultural and weedy species and the following non-Australian species are well known. The potato, *S. tuberosum*, is widely cultivated for its starchy tubers. Some other horticulturally important species are *S. melongena* (brinjal, egg plant or aubergine), *S. quitoense* (lulo or naranjilla) and *S. muricatum* (pepino) all of which are cultivated for their fruit. Drug plants include *S. dulcamara* and *S. viarum* (= *S. khasianum*), which are cultivated mainly in eastern Europe and India as sources of cortico-steroid drugs. Species used for decorative purposes included the herbs and shrubs *S. integrifolium* (scarlet tomato), *S. mammosum* (nipple plant), *S. pseudocapsicum* (winter cherry) and *S. rantonnei* (blue potato bush). Decorative climbers include *S. crispum*, *S. jasminoides*, *S. seaforthianum* and *S. wendlandii*. Weedy species include *S. carolinense* (horse nettle), *S. elaeagnifolium* (white horse nettle), *S. mauritianum* (tree tobacco) (previously widely known as *S. auriculatum*), *S. rostratum* (buffalo burr), *S. nigrum* and *S. americanum* (= *S. nodiflorum*) (black nightshades), *S. hermanni* (apple of sodom) and *S. torvum* (devil's fig). Two Australian species *S. aviculare* and *S. laciniatum* have been grown in recent years as sources of solasodine (Collins et al., 1976; Bradley et al., 1978-79).

In Australia the family Solanaceae includes the following native genera: *Anthocercis* Labill., *Anthotroche* Endl., *Crenidium* Haegi, *Cyphanthera* Miers, *Datura* L., *Duboisia* R.Br., *Grammosolen* Haegi, *Lycium* L., *Nicotiana* L., and *Symonanthus* Haegi (= *Isandra* F. Muell., nom. illeg.). These Australian genera are clearly distinguishable from, and are not as closely related to *Solanum* as a number of American genera which have at times been included in it, such as *Cyphomandra*, tree tomato, *Lycopersicon*, tomato, and *Lycianthes*. Other important genera within the family Solanaceae, but not so closely related to *Solanum*, are *Capsicum*, the peppers, *Cestrum*, ornamental shrubs, and *Petunia*, *Schizanthus* and *Salpiglossis*, all ornamental annuals.

Naturalised and alien species have been marked with an asterisk. The location of specimens cited in the text is indicated by the standard abbreviations listed for each institution in 'Index Herbariorum', *Regnum Vegetabile* 31 (1974). In addition, the following abbreviations have been used, acb for the herbarium of Mr A.C. Beaglehole, and ki for the herbarium of Mr K. Ingram.

History of Australian *Solanum* Taxonomy

The earliest known collection of an Australian *Solanum* is one by Dampier from the North West Coast in 1699. His small collection of plants included a specimen of *S. orbiculatum* Dunal, but was not named or seen by Linnaeus and was not included in 'Species Plantarum'. The first substantial treatment of Australian species was that by Brown (1810, p. 444) where fifteen new species were described, *S. sodomeum* (now *S. hermanni*) and *S. nigrum* were recognised as established aliens, and *S. verbascifolium* auctt. pl., non L. (now *S. erianthum* D. Don) was also cited. Regrettably three of Brown's names *S. biflorum*, *S. violaceum* and *S. armatum* had already been published by earlier authors and must now go into synonymy, but all three had long currency in Australian botanical writing. Brown's (1810) 'Prodromus' predated the early work of Dunal (1813), which included about 20 species from Australia. Dunal (1852) published the only monograph on the genus and included about 30 species from Australia. This was closely followed in time by Bentham (1868) 'Fl. Aust.' vol. 4, where 50 species were considered.

This included many species that had been published by Mueller in Australia. Bentham used an artificial grouping of the Australian species and did not follow the more natural system attempted by Dunal. Bentham considered that the "distinction and determination of the numerous species of this genus is attended with peculiar difficulties" but he obviously did not fully approve of Dunal's monograph, and considered the species "most extravagantly multiplied by Dunal in the Prodrum". Of the 50 species recognised by Bentham from Australia four had been described by him, five by Dunal, thirteen by Brown and twenty by Mueller, the remaining eight were by miscellaneous authors. Bentham's 'Fl. Aust.' has remained a standard work but is now sadly out of date, the number of *Solanum* species in Australia including naturalised aliens being at least 125. The long series of papers by Bitter (1912-1924) contained very little on Australian species. The next author of consequence was Domin who visited Australia in 1910 and published his account and new species in 1913, 1921-1922, 1928-1929. Since then there have been few new species described. No substantial revisions of the genus have been undertaken in preparation of any of the more recently published State Floras. The most recent accounts of new species of *Solanum* in Australia are those by Symon (1971) where nine new species were described, and Henderson (1977). Basic accounts for the whole family are still those by Wettstein (1891, 1892).

Morphology

Habit

Truly annual species of *Solanum* are not common in Australia. Most of the annuals found here are aliens, but many species flower in their first year while *S. pugiunculiferum*, possibly *S. lucani*, *S. echinatum* and most species of the *S. nigrum* group live longer than one year only under favourable circumstances.

The most common form in Australia is a small shrub, relatively short lived, that develops from an adventitious bud on extensive shallow root systems. The largest species are small trees with a single trunk up to 20 cm in diameter and with a spreading crown up to 10 m high. The largest native species are *S. viride* and *S. macoorai* while the aliens *S. erianthum* (= *S. verbascifolium* auctt. pl., non L.), *S. mauritianum*, *S. giganteum* and *S. hispidum* reach a maximum height of about 6 m.

Baylis (1968) has shown that several native species in the subgenus *Archaeosolanum* flowered only in long days. There were day-neutral races in *S. simile* and *S. capsiciforme* and in *S. aviculare*, but apparently not in *S. laciniatum*; flowering times were adapted to latitude and temperature. Haviland (1886, 1887) noted that *S. nigrum* flowered in July about Sydney and that *S. aviculare* flowered in September. In the field many species continue flowering over a long period of time if not restricted by drought or low temperatures. Of the many species grown by the author all flowered in their first year including small tree species such as *S. erianthum* and *S. viride*. The weedy annual species, *S. nigrum* and *S. rostratum* may be extremely rapid in development under good conditions and these can flower within four weeks from germinating.

Species of *Solanum* frequently grow in disturbed habitats, roadside excavations, rocky gullies, scarp breakaways, logging tracks in forest, newly cleared forest and after fire has burned vegetation. Even in the arid areas where the canopy is rarely closed, they favour disturbed sites and are often best developed along grader tracks and one wonders how they fared before roadmaking was common. Latz (1976) writes "Recent observations on bushfire ecology indicate that without exception *Solanum* are important "fire weeds". Their underground stems enable them to shoot rapidly after fire, and ahead of most other species. Fruiting is heavy beginning in four months under favourable conditions and the general vigour of the colony appears to be stimulated by the fire".

Roots

Most of the shrubby Australian species of *Solanum* form clones of few to many stems from an extensive underground root system. This form of reproduction is widespread in Australian species, and is probably more common in the genus than has been recognised, as it is rarely indicated on herbarium specimens. Observations on Australian species in cultivation at Adelaide and in the varied *Solanum* collection at Birmingham have shown that the phenomenon is common in the genus.

The horizontal roots from which the stems emerge are generally shallow, about 10 cm deep. The new stems emerge at varying distances from the parent plant and the following examples of distances from the parental plant were obtained in cultivation in the field at Adelaide for the following species: *S. esuriale* 22-45 cm, *S. coactiliferum* 32 cm, *S. dense-vestitum* 15-45 cm, *S. ferocissimum* 35-45 cm, *S. lacunarium* 15-30 cm, *S. tetrahecum* 25-43 cm, and *S. tomatillo* (S. American) 75-90 cm. The plants may form extensive colonies of many stems or may consist of a few individuals. The longevity of these aerial shoots varies with the species. Some are truly herbaceous perennials (e.g. *S. esuriale*), where the aerial parts are usually of seasonal duration, others are large shrubs with trunks to 5 cm diameter, and these persist from several to many years (e.g. *S. phlomoides*). There seem to be no recorded data on the longevity of these shrubs or colonies. Whether extensive populations, which may cover a hillside (e.g. *S. ellipticum* or *S. petrophilum*), are each comprised of one genotype is not easy to decide. Limited observations on leaf and flower colour variants within a colony (mainly on *S. ellipticum*) show that these usually consist of relatively few stems and that the colonies are not a single clone. In the androdioecious species, where the male and hermaphrodite plants are readily identified, the colonies may be 20-25 m or more across and consist of many stems. In yet other cases the colonies appear extensive and homogeneous and could well be a single clone. It has been noted that species in the black nightshade group (section *Solanum*), the section *Archaeosolanum*, and *S. pugiunculiferum* will produce adventitious roots from their stems under suitable conditions. Many species are readily reproduced from stem cuttings. Natural vegetative reproduction is known in other plant groups, and when combined with apomictic reproduction, may seriously complicate the taxonomy, e.g. *Rubus*, *Poa*, *Hieracium* and some *Cassia* species. However I have found no evidence of abnormal seed production in *Solanum*. The extensive underground root systems have undoubtedly contributed to the success of *S. carolinense* and *S. elaeagnifolium* as weeds. Both of these species have become widespread and are difficult to control. Almost all studies on root systems have been on weedy species of economic importance, and the following papers discuss aspects of the root systems of *Solanum*. References to the roots of potato are not included. None of these references refer specifically to Australian species but to weedy *S. carolinense* and *S. elaeagnifolium*—Davis et al. (1945 p. 1-14); Furrer and Fertig (1961); Tisdell et al. (1961 p. 356); Ilnicki et al. (1962); Davis and Weise (1964 p. 367); Davis et al. (1967 p. 555).

Stems

As most of the Australian species are shrubby plants of relatively short life span, few develop woody stems more than a few centimetres thick. Large old shrubs of *S. asymmetriphyllum* and *S. phlomoides* have been seen with stems 5 cm in diameter. The stems of the species *S. aviculare* and *S. laciniatum* may occasionally reach 10 cm diameter, and the small tree species *S. hispidum*, *S. erianthum* and *S. viride* have stems which may become 15-20 cm in diameter. In all cases the wood is soft and light in density. The bark, often bearing prickles, may have conspicuous lenticels e.g., *S. tetrandrum*, or become fissured and corky with age e.g. *S. phlomoides* or *S. dallachii*. As could be expected, the bark of old stems is rarely seen in herbarium collections. Inamdar and Murthy (1977) discuss vessels in some Solanaceae, and Bonnemai (1970) internal phloem. Branching in *Solanum* was studied by Danert (1958, 1967), Brunaud (1973) and Child (1979).

Leaves

The leaves of the Australian species may be entire, lobed or pinnatisect, no native species having truly pinnate leaves. When compared at a similar physiological age or stage of growth the leaves are reasonably reliable as a taxonomic character. However, there are great differences in leaf shape and size during development, particularly in the section *Archaeosolanum*, where the deeply pinnatisect leaves may be 30 cm long, and the later entire leaves on the same branch may be linear or lanceolate and only 10 cm long. The morphology and anatomy of *S. laciniatum* and *S. brisbanense* are compared by Shreter and Gerasimenko (1973 p. 75). The instability of leaf morphology of three Australian species *S. aviculare*, *S. stelligerum* and *S. vescum* as a taxonomic character was pointed out by Hamilton (1916). Juvenile plants of *S. hispidum* may have leaves as large as 72 x 44 cm, although the adult leaves are more usually about 25 x 20 cm. Roe (1966) described a similar situation in two Mexican species, *S. mitlense* and *S. blodgettii*. Other sections of the genus in Australia rarely have leaves which show these extremes but in general juvenile leaves are larger and tend to be more deeply lobed than adult ones. In particular, leaves on old distal shoots may be small when compared with those from strong new growths.

Hamilton (1896) recorded the presence of domatia on the leaves of the cultivated *S. jasminoides* and Carey (1930) in a study of the leaf buds of woody perennials in the New South Wales flora listed *S. prinophyllum* (as *S. xanthocarpum*) and *S. hermanni* (as *S. sodomeum*) as species with naked buds. The following references consider aspects of the leaves of *Solanum* but all refer to *S. tuberosum* or related species:- Bukasov and Roborovska (1965 p. 18), leaf morphology; Kostina (1965 p. 36), leaf types; Sinel'nikova (1965 p. 50), leaf morphology; Sizova (1965 p. 108), leaf anatomy; Ugent (1967 p. 696), morphological variation; Simmonds (1968a p. 504), leaf size change in evolution of potato; Hawkes and Hjerting (1969 p. 102), leaf terminology; Bukasov and Sinel'nikova (1970 p. 143), leaf morphology; Schutte (1966 p. 96), comments on the influence of molybdenum deficiency on the morphology and development of *S. nigrum*; Inamdar and Murthy (1978), some aspects of leaf architecture.

Prickles and hairs

The presence or absence of prickles and/or hairs, their distribution and form have been used extensively in the past to separate taxa and the taxonomic value of these attributes is considerable. The distribution and density of prickles is more variable than that of hairs. Some species which are usually unarmed e.g. *S. centrale* and *S. esuriale* sometimes have prickles. The Queensland species *S. viride*, is unarmed on almost all herbarium sheets, but the young plants are sparsely prickly; *S. macoorai* has few prickles on adult twigs, but is ferociously prickly as a seedling and the contrast is striking. The nature of the prickles is often not representative on apical twigs or fragmentary specimens. Hamilton (1916) commented on the variability of prickles in *S. stelligerum*.

There is a diversity of hair types in the genus from simple uniseriate hairs and glandular hairs to complex stellate or echinoid forms. The value of the hairs as an aid to the identification of pharmacological products was appreciated early, e.g. Small (1913). Cannon (1909) published details of an early experiment on the inheritance of hair types in crosses of species belonging to the *Morella* group (section *Solanum*); Sizova (1965a) discussed the pubescence of the tuber-bearing species (section *Petota*). Papers by Gibson (1971, 1974, 1978) show that the glandular hairs of some tuber-bearing species greatly reduce the activity of aphids, Colorado beetle, spider mites and flea beetles.

Luckwill (1943) described the hairs of *Lycopersicon*, and Georgieva and Achkova (1970) used the hair types as diagnostic characters in a study of the genus *Lycopersicon*.

and the closely related *Solanum pennellii*. Wessely (1960) described the hairs of section *Solanum* (black nightshade group), all being simple, uniseriate or glandular, and none being stellate.

The hair types of the whole genus were described in an important paper by Seithe (1962). She studied 500 species in the Munich herbarium, and on the basis of their hair type allocated these to the infra-generic taxa then available. About 24 Australian species were amongst those studied by Seithe. However, I do not consider the taxonomic allocation of many of these species to be satisfactory, as is discussed further in the section on subgeneric taxa. Seithe's paper is useful, as it was the first conspectus of the entire genus, since the monograph by Dunal (1852) and it sorts out much of the earlier work of Bitter. In a recent paper Roe (1971) has greatly improved the descriptive terminology of the various hair types, and I have attempted to follow Roe in this revision.

The Australian species mainly belong to the sections with well developed stellate hairs, but there are exceptions with very few stellate hairs e.g. *S. oedipus* or *S. hystrix*. In rare cases they may even be lacking e.g. *S. papaverifolium* and *S. pugiunculiferum*. The native species *S. campanulatum*, *S. cookii*, *S. ashbyae* and *S. gabrielae* have abundant glandular hairs.

In addition to the papers referred to above the following also discuss aspects of the hairs or epidermis of *Solanum*: Romanovich (1960), leaf epidermis; Patel and Shah (1971) and Patel and Inamdar (1971), stomates; Uphof and Hummel (1962), leaf hairs; Ahmad (1964a), leaf epidermis; Ahmad (1964b), leaf cuticle; Chandra (1967), leaf epidermis (including *S. aviculare* and *S. laciniatum*); Juhasz (1968), histology of the epidermis; Inamdar and Patel (1973), structure and ontogeny of trichomes.

Inflorescence

The inflorescence of the genus *Solanum* is a variously modified cyme; this is initially terminal but soon appears lateral as it is overtopped by the growth of an axillary bud. The growth units are therefore sympodia. In addition to being displaced by an axillary shoot the inflorescence is often concaulescently adnate to the shoot and is carried up and appears in an extra-axillary position. The cymes may be branched and the inflorescence panicle or corymbose in form, or, more often are reduced to a simple cyme that may appear racemose or even sub-umbellate. In extreme cases the cyme is reduced to 1-2 flowers. Where the peduncle is adnate to the stem it may be very short or absent and the flowers appear pedicellate from the main stem. Comprehensive accounts of branching patterns in the region of the inflorescence have been given by Danert (1958, 1967) and by Child (1979).

In this account the term peduncle is used for that portion of the inflorescence below the first flower, and the term floral rhachis for the portion bearing flowers. Many species in section *Melongena* have basal female flowers with male flowers on the rhachis above and the peduncle is effectively lacking; this is not always apparent if the basal flower has been shed and pedicel scars should be noted.

Flowers

Pedicels

The pedicels of Australian species are articulate at their base, and unfertilized flowers are shed leaving a small scar on the peduncle. This is in contrast to many of the tuber-bearing species, the pedicels of which may be articulate up to the mid-point of the pedicel. The only Australian species noted with any tendency for articulation above the base is *S. linearifolium*, where the abscission layer may be several millimetres above the base in some pedicels.

Calyx

The calyx of *Solanum* is generally campanulate in form with variously developed lobes. D'Arcy (1971) has studied the vasculature of the calyces of selected *Solaninae*. Only an abstract of D'Arcy's paper has appeared and I have not seen details of his work, nor have I seen the paper by Yoneda (1975) on flower bud differentiation and development.

In many Australian species the calyx tube enlarges and invests the mature fruit closely in contrast to the loose envelope of *Physalis* and *Nicandra*. The enlarged calyces in *Solanum* are almost always prickly e.g. *S. echinatum*. In other species the actual calyx tube is not much enlarged, but the calyx lobes elongate and envelope the fruit which is exposed between them e.g. *S. petrophilum*. In a few species the calyx lobes are markedly reflexed when the fruit matures e.g. *S. clarkiae* and *S. melanospermum*; but generally they remain appressed or are at most loosely raised. The calyx lobes of *S. marginatum*, *S. heteropodium* and *S. densevestitum* may be flattened, green and leaf-like.

Corolla

The *Solanum* corolla consists of a short tube expanded into a limb, which may be stellate, rotate or campanulate in form. The corolla is usually regular but there are sections with some degree of zygomorphy, conspicuous in section *Androceras* and section *Neolycopersicon* from America, but no Australian sections are as extreme as these.

Differences in shape of the corolla are of considerable assistance in defining groups and identifying species. The corollas are of delicate texture and rarely press well unless special care is taken, although dried specimens can be reconstituted by soaking. Preparations made by drying individual corollas between soft felted paper, cloth, tissues or foam plastic, or better by sticking them directly onto card after separating the various parts, are useful for preserving the size and shape of the calyx and corolla.

In almost all Australian species the corolla is pubescent to some degree on the back, or on the tips, occasionally they may be pubescent on the face. The corollas of *S. hystrix* and *S. hoplopetalum* bear prickles.

Both Correll (1962) and Hawkes and Hjerting (1969) illustrate the corolla form of many of the tuber-bearing species and help clarify the terms rotate and stellate in the context of *Solanum*. However, in addition to these common forms, several Australian species have deeply campanulate corollas e.g. *S. campanulatum* and *S. pugiunculiferum*. The deeply stellate corollas of some species e.g. *S. ferocissimum* or *S. nummularium* may be strongly reflexed. Sinel'nikova (1965a) gave an account of the daily rhythm of movement of potato corollas, and showed that different species had different patterns of movement. No systematic work has yet been done on the native Australian species, but observations of plants in cultivation show that there are differences between species in this respect.

An interesting account of character displacement where two species have a similar corolla size when allopatric, but diverge in size when sympatric, is given by Whalen (1978a).

Corolla colour in the Australian species is dominated by shades of mauve, violet or purple with a few white or pale blue flowered species; there are no yellow flowered native species. Flower colour varies with the age of the flower and with temperature; colours fade with age and at high temperatures. The corollas are pale when they develop in hot sunny weather and darker when it is cool and cloudy. In cultivation two species, *S. ferocissimum*, a native, and *S. sisymbriifolium*, S. American, have had white flowers in summer and pale blue flowers in winter. Gascoigne et al. (1948) record the anthocyanins in five Australian species.

Kessel and Marks (1970) described a technique for making chromosome counts using

corolla preparations. Cooper (1927) described the anatomy and development of the tomato flower, Daniel and Sattler (1978) the development of the perianth tube of *S. dulcamara* and Nishino (1978) corolla formation.

Stamens

The filaments are frequently short (longer in section *Archaeosolanum*) and are joined at their base to the corolla tube. In the stellate-haired species they are of little diagnostic value, but in section *Solanum* they are pubescent.

The shape of the anthers was used by Dunal to make a major division in the genus between the 'Pachystemonum' with short thick anthers and the 'Leptostemonum' with tapered elongated anthers. This division separated most of the stellate-haired species from the rest, and has been maintained in a modified form by Danert (1970) and D'Arcy (1972). Sendtner (1846-1856) illustrated the anthers of many species from Brazil and his seven plates show a range of anther types. Despite this, anthers have not been used much in species delimitation, and more work is justified on the genus as a whole, particularly in relation to pollinating mechanisms and pollen vectors. Halsted (1890) published a small note on the anatomy of some non-Australian species.

Not only do the anthers differ in shape between species but in two groups, section *Androceras* (e.g. buffalo burr), and section *Nycterium*, the anthers vary greatly within each flower. An early paper discussing the anther forms in *S. rostratum* was that by Todd (1882). In this species four anthers are equal in size but the fifth is twice as long and is twisted to one side. The style is also turned to one side and Todd showed that there was a regular production of 'left-handed' and 'right-handed' flowers along the inflorescence. The Australian species have regular corollas and anthers.

Although species of both oblong and tapered anther groups occur in Australia, none of the native species are markedly heterantherous. The male and hermaphrodite flowers of the androdioecious species have not yet diverged greatly in the form or size of the anthers; however, the pollen of the hermaphrodite flowers has a much lower percentage of fertile grains.

In most generic descriptions the anthers of *Solanum* are described as connivent, but in many Australian species they are only loosely erect or may be widely divergent. The anthers of most species of *Solanum* are poricidal, i.e. open by terminal pores at the apex of the anther. This is a specialised form of pollen release and is shared by a limited number of unrelated genera. The pores may be quite small and never enlarge (most species of the subgenus *Leptostemonum*), or may ultimately split down the side of the anther to a greater or lesser extent (subgenus *Pachystemonum*). The New South Wales species, *S. karsensis*, is exceptional in the first subgenus as its anther sacs split lengthwise and the pollen is fully exposed.

In all native species the anthers are conspicuously yellow. The anthers of *S. nigrum* show differential absorption of ultra-violet light in contrast to the corolla (Utech et al., 1975; also Buchmann et al., 1978), and at least a dozen Australian species behave in a similar way (Symon, unpublished). It is likely that this is significant for their recognition by pollinating insects. The showy yellow stamens are a particularly consistent feature of hundreds of species of *Solanum*.

Few groups of insects are able to extract pollen from poricidal anthers. The two most important groups are the *Syrphidae* (hover flies) and many species of bees especially the solitary bees, but excluding *Apis* (honey bee). There is now a great deal of evidence showing a close relationship between solitary bees and *Solanum* pollination (Buchmann et al., 1978). The bees invert their bodies over the individual anther or anther cone and vibrate or 'buzz' the anthers to release pollen onto their ventral surface from where it is groomed into the pollen baskets. The large bees may invert the whole flower by their

weight but this certainly does not occur with the small bees which 'buzz' a single anther at a time. The relationship between solitary bees and *Solanum* is close and specialised, the poricidal anthers and general lack of nectar greatly reducing the possibilities of pollination by other insects. An account of the role of solitary bees may be found in Buchmann et al. (1978), and the evolutionary consequences of this specialisation in Symon (1979). An early observation of these bees on *Solanum* is Cheel (1908).

Pollen morphology of the tuber-bearing species was examined by Romanov (1965) who was not able to find much variation, and by Anderson and Gensel (1976) in sect. *Basarthrum* and other species by Murry and Eshbaugh (1971), and Punt and Mouna-Brands (1977). Basak (1967) described eight pollen types in the family, but concluded that within the genus *Solanum* the pollen was of the same general type with only minor variations. He considered the genus fairly homogeneous and stabilised. The pollen grains are small with little or no ornamentation. This is not surprising considering the manner of their release, for obviously large or highly ornamented grains are more likely to block the anther orifice. Adhesion of pollen to the vectors is achieved by the practice of the bees moistening and moulding the pollen with sticky liquid from their crops and by their generally dense covering of branched hairs.

A significant recent development has been the demonstration by Anderson (1979a) that the pollen from male plants of dioecious species is tricolporate and that from the female plants is inaperturate and non-germinable although this pollen stains well and the flowers appear hermaphrodite.

Hamilton (1886, 1887), in lists of the flowering seasons of Australian plants, included *S. nigrum* flowering in July and *S. aviculare* flowering in September in the Sydney region. Baylis (1968) discussed the influence of day-length on the flowering of the section *Archaeosolanum*. Glushchenko (1968) discussed the flowering biology and embryology of *S. aviculare*. The following papers refer to aspects of the flowers of *Solanum* but not specifically to Australian species: Baehni (1946) flower buds of the Solanaceae; Magtang (1936) and Prasad and Prakash (1968) floral biology of *S. melongena*; Scotti (1908) heteranthery; Harris (1905) poricidal anthers; and Salgado (1969) pollen of some *S.* American species.

Gynoecium

The ovary is usually globular in shape or nearly so and is not distinctive in separating species. It may be glabrous or sparsely or densely pubescent with stellate or glandular hairs.

The ovary is basically bilocular, the expanded axile placenta bearing numerous ovules. However, in a number of species the septa are not apparent in the mature fruit e.g. *S. chenopodium* and *S. viride*. In other cases secondary septa develop between the principal lobes of the placenta and the ovary may appear to have four loculi e.g. *S. quadriloculatum* and *S. echinatum*. In yet other cases the placenta appears to expand to fill the loculi and the seeds appear embedded in it, the septa then being obscure e.g. *S. lacunarium* and *S. simile*. The carpels and placenta of several species of *Solanum* were described in detail by Murray (1945) and Guedes (1964). The embryology of *S. aviculare* was described by Glushchenko (1968).

Bhatnagar and Uma (1969) discussed the structure of the style and stigma of *S. melongena* and *S. nigrum*. The style is usually glabrous but may be sparsely or densely pubescent towards the base. Style posture is distinctive and varies between species. Styles may be erect and project beyond the anthers or be declinate and somewhat sigmoid in shape, projecting sideways between the anthers, the stigmatic tip then often bent or almost hooked.

The stigma may be small and terminal, capitate and obscurely lobed, or in some of the

dioecious species, markedly bifid with each arm up to 5 mm long. No doubt these variations are related to pollinating mechanisms. Observations on three species of *Solanum* in the Flinders Ranges show that small bees, e.g. *Nomia* sp., clamber over the stigma when the style is erect but completely miss the stigma when it is in a lateral position. It is likely that those species with lateral stigmas are pollinated by the much larger bees, e.g. *Amegilla* sp., whose flanks and hind legs may contact the stigma.

Unfortunately, little is known of the relationship between insects and particular *Solanum* species. It is noticeable that the dioecious species have larger and more conspicuous stigmatic surfaces than the hermaphrodite species.

Floral Heteromorphism

Among the Australian species three forms of flower occur. The first form (hermaphrodite) occurs on racemose cymes bearing one to many flowers. All the flowers are perfect although only a small proportion of them usually set fruit. Such species occur over the whole geographical range of the genus in Australia.

The second form (andromonoecious) has one or few hermaphrodite flowers below a cyme of few to many male flowers. These were recognised and described by Dunal in 1813. The bisexual flower(s) may be on the peduncle bearing the male flowers, or inserted at the base of it, and usually these flowers are larger, have stouter pedicels, prickly calyces, and their pollen is fertile. The male flowers have a slender pedicel, fewer prickles and are generally smaller. Only one to three male flowers mature at any one time, and the floral rhachis gradually lengthens as a succession of buds develop and the spent flowers fall. Most of the Australian examples have a single hermaphrodite flower and numerous (up to 60) male flowers, e.g. *S. dioicum*, whereas some of the exotic species have several hermaphrodite flowers and few (1-6) male flowers, e.g. *S. hermanni*. In *S. melongena* (egg plant) it is probable that domestication has resulted in the almost complete loss of male flowers. The andromonoecious species can usually be detected when in fruit by the remnant of the rhachis of the male flowers remaining after the flowers have fallen. Intersexes have been seen in the field (e.g. *S. diversiflorum*) and in cultivation (*S. oedipus*), where small fruits occur on the male portion of the cyme. In Australia the andromonoecious species are mainly northern and western in distribution.

Several sections of the stellate haired species contain andromonoecious species. Various stages of evolutionary development of the andromonoecious condition occur in species in widely different areas. The phenomenon does not appear to occur in the tuber-bearing species nor amongst the black nightshades (section *Solanum*). No adequate survey of its occurrence in the genus has yet been made. Early and overlooked papers by Harris and Kuchs (1902) and Harris (1903) were brought to my notice by D'Arcy. These published data on *S. carolinense* show that an average of 82% of the flowers as perfect and that 18% had reduced styles, but there were substantial differences in different collections. The first one or two flowers on the cyme were usually perfect and thereafter the percentage of perfect flowers fell steadily in relation to the position along the floral rhachis. Harris and Kuchs (1902), Murty and Abraham (1975), Reddy and Bahudar (1977) and Baksh and Iqbal (1978) also give some observations on other species. Miller (1969) discussed the development of the unusual fruit of *S. mammosum*, but did not discuss the upper male flowers. *S. mammosum* is a cultivated ornamental species with large orange-red fruit attenuated to a nipple-like apex and with 0-5 lobular "mammillae" at the base of the functional central ovary. Miller (1969) called these basal outgrowths "carpellary enations" and Martin (1972) called them "styliiform appendages". In addition, normal styles were found in the first flower of the inflorescence and in subsequent flowers the styles are drastically reduced in length. Although all lengths between 1 and 12 mm were recorded, the distribution was distinctly bimodal. Martin found that removal of the first flower did not affect the length of the style of subsequent flowers. Pollen from both

types of flower was fertile, but pollen did not germinate on, nor penetrate, stigmas that were 75% of the normal length or shorter. He also showed that embryo sac development was abnormal in the short styled flowers. The fruits of wild type *S. mammosum* are normally globular and the bizarre cultivated fruits are almost surely the result of selection under domestication, Gentry (1974), Nee (1979).

The third form (dioecious) consists of plants bearing erect cymes of numerous male flowers, and separate plants with hermaphrodite flowers. The male flowers are generally smaller and their calyces less prickly; only a few open at any one time and the floral rhachis gradually lengthens (to 15 cm in some cases) bearing a tuft of a few flowers and unopened buds at its summit. Intersexes have been seen in the field (e.g. *S. dioicum*). The ovary, style and stigma are usually vestigial and together total a few millimetres in length. However, some "male" plants do have a partially developed style and stigma in their lower flowers (e.g. *S. petraeum*). The hermaphrodite plants bear large solitary flowers, which are stoutly pedicellate but without a developed peduncle; the calyx tube is almost always prickly, the flowers are perfect, some pollen is fertile and in some species the stigma is large and bifid. When seen in isolation these species with the separate and rather different inflorescences have caused confusion in the past, and isolated hermaphrodite flowers of the dioecious species are not readily separated from the normally hermaphrodite group. They have probably evolved from the previous andromonoecious group and are confined to northern and western Australia. With the exception of the *S. dioicum* complex, they are localised in distribution, Symon (1970a, 1979). For an account of pollen dimorphism in an American dioecious species see Anderson (1979).

Hossain (1973) recently described stylar heteromorphism in several species including *S. torvum* (a weedy pan-tropic species established in Queensland). Short or long styled flowers may occur within a single inflorescence. It is clear from his description that either the distal flowers only, or those produced late in the season, are short styled, and that there is a clear disjunction in the measurements of the short and long styled flowers. The short styled flowers do not set fruit even when hand pollinated. I would suggest that this is a yet earlier stage in the evolutionary development of the andromonoecious forms, differing from them in the species cited in the numerous fructiferous flowers (80-85% of an inflorescence comprising 40 flowers), and in the relatively larger style and ovary, cf. the vestigial remnants in the more evolved groups. Short styled flowers have been noted occasionally in some Australian species e.g. *S. ferocissimum*. Wakhloo (1975) studied the effect of nutrition on heterostyly.

Fruits

The fruit in the genus *Solanum* is described as a berry which is usually understood to be fleshy, indehiscent and of uniform texture, but there is a greater range of fruit forms in the genus than is generally understood. The mature ripe fruit may be succulent e.g. *S. nigrum* (a typical berry), firmer and somewhat dry e.g. *S. capsicoides*, finally dry with a papery skin, and the seeds either adherent to the placenta or loose (they may rattle) e.g. *S. cinereum* and *S. hermanni*, with a firm bony "flesh" e.g. *S. petrophilum* and *S. quadrilocolatum*, or with an adherent calyx and with subcapsular dehiscence e.g. *S. rostratum*. The fruits of *S. tudununggae* are unusual. The berry abscises towards the base and is retained within the firm enclosing calyx tube. As it shrinks and dries the seeds are released and may be shaken out of the relatively small orifice of the calyx the whole behaving as a censer mechanism.

Not only do the berries vary in texture at maturity, but the colour of the mature fruit is also useful and appears to be a fairly constant character. Invariably the young fruits are shades of green or marbled light and darker green. The patterning on fruits was discussed by Bitter (1917). The fruits of those species that are green at maturity, e.g. *S. simile*, *S. vescum*, often become pale and slightly translucent when ripe, or may become flushed

with a purple tinge particularly in cool weather. The fruits of the species that colour, go through a range of shades, e.g. greenish yellow, yellow, orange to red, or directly from green to red; yellow fruits may finally become dark brown and some red fruits black; green fruits may change to brown. Perlova (1946) described the morphology of the berries of the tuber-bearing species as a taxonomic character. She considered that they provided good diagnostic characters and should be included in keys to the species. I would agree with this opinion, but the main drawback to the more extensive use of the berries is that they are often absent or poorly preserved on herbarium specimens. I disagree with Gray (1968) who considered that berries failed to provide any contrasting characters at or below the generic level. This may apply to the particular section *Solanum* with which she was working, but it does not apply to some other sections of the genus. Wettstein (1891) and Wessely (1960) used berry colour in their keys. Venkateswarlu and Rao (1971) published work on the inheritance of fruit colour in the *S. nigrum* group but this has not been available to me. I agree with Gray (1968) in being sceptical of a number of early accounts alleging the occurrence of a range of fruit colours in one species or on one plant. The inheritance of form and colour of the fruits in the egg fruit *S. melongena* was studied by Filov (1940), Sambandam (1967) and Tigchelaar et al. (1968). Miller (1969) and Martin (1972) described the morphology of the peculiar mammiform fruits of *S. mammosum*. Little work has been published on the inheritance and stability of fruit colour in any other species. Valadon et al. (1975) give some information on carotenoids in two species of *Solanum*, and Francis and Harborne (1966) the anthocyanins of *S. scabrum*.

The ripe fruits of the subgenus *Archaeosolanum* are attractive to birds which eat the fruits and presumably distribute some seeds. Paton (1976) reports that silvereyes and yellow faced honey-eaters feed on *S. laciniatum*. Griffiths (1977) reports mistletoe birds eating *S. nigrum*. Lea and Gray (1935), Frith and Baker (1975), Frith (1976), Crome (1976) and Scarlett (1976) all report the consumption of various tropical *Solanum* fruits by frugivorous pigeons. In additions, the emu undoubtedly eats (or ate) a wide variety of *Solanum* species, and Noble (1975), Latz (1976) and the author have recorded the consumption of *S. ellipticum*, *S. esuriale*, *S. centrale* and *S. gilesii* by emus. The fruits of some other species appear to be less palatable e.g. *S. prinophyllum*, *S. tetrahecum*, although I have noticed wild kangaroos eat the ripe fruits of *S. coactiliferum*. Cleland and Tindale (1954) refer to euros and wallabies eating *S. quadriloculatum* and *S. ellipticum* in Central Australia while Newsome (1976) records the red kangaroo eating *S. ellipticum* and Waring (1976) reports that the quokka eats *S. simile* fruit. Some species, especially those with firm dry fruits, may retain them on the plant for at least a season, e.g. *S. petrophilum*, *S. quadriloculatum* and *S. phlomoides*, and the method of seed dispersal is not understood. Other species, e.g. *S. cleistogamum* and *S. opacum*, produce pale green, aromatic, succulent fruits which are readily shed onto the ground when ripe. Species like *S. lucani* and *S. echinatum*, *S. hystrix* have fruits almost totally enclosed in prickly calyces that lie close to the ground at maturity. Maiden (1916) considered that the prickly fruits of *S. rostratum* were distributed by stock; however, they do not separate from the plant readily, and, as the "berry" is sub-capsular, the seeds are likely to be shaken out by mechanical disturbance. In contrast, the fruits of *S. echinatum* are shed onto the ground and could be transported by animals. *S. petraeum* also has fruits almost totally enclosed in an enlarged prickly calyx. In this case the calyx is relaxed and opened at maturity and may be retained on the plant for some time after the somewhat leathery green fruit has been shed on the ground.

There are numerous records of *Solanum* fruits being eaten by the Aborigines: Mitchell (1838) *S. esuriale*; Mueller (1855) *S. vescum*; Richards (1882) *S. hystrix*; Maiden (1889) *S. aviculare*; Carnegie (1898), Maiden (1899) *S. chippendalei* (as *S. sosomeum*), Cleland (1932), Cleland and Johnston (1939), Sweeney (1947), Irvine (1957), Webb (1959), Hope

and Gould (1969-71). The list is by no means exhaustive. For a recent summary of the Aboriginal uses of *Solanum* in Australia see Peterson (1979). The fruits that I have tried, *S. simile*, *S. aviculare*, *S. ellipticum*, have not been palatable to me, mostly leaving a hot burning taste. However P. Latz, in Alice Springs, showed me that *S. ellipticum* and in particular *S. cleistogamum* were palatable when fully ripe, and that *S. centrale* when partially dried and raisin-like was acceptable. The fruits of the maurellas (sect. *Solanum*) are rather insipid and displeasing in flavour, but *S. burbankii* received much publicity 60 years ago as Burbanks' "wonderberry" (Heiser, 1969). An account of fruit type and dispersal in *Solanum* in Australia is given in Symon (1979).

The presence and number of stone cell concretions or sclerotic granules in the fruit have been studied by Bitter (1911, 1915) and by Danert (1969). They are present in some sections of the genus and family, and, where they occur, are useful if not invariable characters. They are present and conspicuous in all species of the section *Archaeosolanum*, and were used by Baylis (1954, 1963) to assist in separation of the species. They also occur in some species of the section *Solanum* (maurella) and should be searched for. They are not known to occur in the subgenus *Leptostemonum*.

Seeds

As with fruits, little systematic work has been devoted to seed characters in *Solanum*. Ovule and embryo development have been studied by Chatin (1874), Soueges (1922), Bhaduri (1935), Magtang (1936), Walker (1955), Lee and Cooper (1958), Malherios-Garde (1959), Dnyansagar and Cooper (1960), Kishore and Singh (1963), Orlova (1965), Saxena and Singh (1967, 1969); and structure of the testa by West (1866), Soueges (1907), including *S. aviculare* and *S. laciniatum*, Wisselingh (1921); general anatomy by Netolitzky (1926), Orechova (1937), Martin (1946), Mohan (1970), Gunn and Gaffney (1974). Perlova (1937) examined the seeds of wild and cultivated species of potato. She found that the seeds of certain species of potato exhibit definite systematic characters and considered that these should be studied in greater detail. Some systematic studies on seeds have been done by Wojciechowska (1972), not seen, and Isely (1947). Little of the above work refers specifically to Australian species. I agree with Pervola on the usefulness of seed characters. Burbidge (1960) and Haegi (1976) have shown that the seeds of *Nicotiana* and *Datura* are frequently distinctive and are most useful in separating species. There is a close parallel in the seed characters of *Solanum*. The seeds of Australian *Solanum* vary in colour from black through livery-brown to off-white or distinctly yellowish, and may be smooth or reticulate on the surfaces. Seed numbers range from 5 to 1500 per fruit. The number of seeds depends upon the number of ovules originally present, the number fertilised, and the environment during development. If extremely small or large fruits are excluded, the number of seeds is fairly stable. Where trusses of fruits occur the basal fruits almost always contain more seeds than the terminal ones. Seeds vary in size from 1-4 mm across and are almost always markedly flattened. A distinct wing surrounds the seeds of *S. capsicoides*; the seeds of *S. seaforthianum* appear hirsute with the remains of cell walls projecting outwards; a thickened margin is evident in a few species, e.g., *S. sturtianum*.

Seed preparations can readily be made by squashing ripe fruits onto a fine sieve in a smooth flow of water, and after gentle rubbing the seeds can be transferred to absorbent paper to dry. Larger amounts of ripe fruit can be put into a blender full of water, and after maceration, the debris can usually be decanted. Dry fruits can be soaked for a few hours and rubbed onto a sieve. Where stone cell concretions are present and are to be counted the sieve apertures have to be quite small (less than 0.5 mm) as in some species the concretions are minute. Where this is so, individual berries may be crushed directly onto paper and the debris searched.

Germination

The germination and storage of potato seed has been discussed by Firsova (1937); Spicer and Dionne (1961); Simmonds (1963, 1964, 1965, 1968) and Howard (1969), and of various other species by Oswald (1908); Wakhloo (1964, 1965); Moraes and Vincente (1970); Vincente et al. (1970); Vincente (1972); Roberts and Lockett (1977, 1978) and Wagenvoort and Opstal (1979). Some evidence for the longevity of *Solanum* seeds is to be found in Quick (1961), Odum (1965) and Suzuki (1969). I have found that a number of species remain viable for at least eight to nine years. Seed proteins were used by Edmonds and Glidewell (1977) in their studies of sect. *Solanum*, and the ethereal and fatty oils of *S. laciniatum* seeds were studied by Erno and Foldesi (1963).

Few publications are relevant to Australian species, but include Laza and Raisnu (1963), Foldesi, Svab and Vagujfalvi (1963), Gerasimenko (1967, 1969a), Sudiatsko and Wilson (1974), Porter and Gilmore (1976) and Porter and Clark (1979) all concerned with the germination of *S. laciniatum*. I have attempted to grow all of the Australian species for which seed has been available and though few species have failed completely they often have very low figures for germinability. Seed treatments including aerated steam, gibberellin, KNO_3 , have not greatly increased percentages of germination. The most effective treatment has been the use of alternating temperatures. In general, the alien weedy species germinate freely.

Germination is epigeal, the cotyledons usually being lanceolate to ovate in shape and pubescent with some simple or glandular hairs. The hypocotyl is often pubescent. The first leaf is always simple and entire or at the most shallowly lobed. Later leaves are often more complex with lobes, prickles and varied hairs. The cotyledon morphology of wild potato species was studied by Roborovska (1965). There are differences in cotyledon size and shape but these are not particularly distinctive, although there is a greater range in the Australian species: a few are distinctive such as the almost linear cotyledons of *S. pugiunculiferum*.

Cytology

Fedorov (1969) summarises the published chromosome numbers of the genus *Solanum* and lists 356 determinations. Of this array 63% are diploid ($2n = 24$), 11% are tetraploid with smaller numbers of triploids, pentaploids and hexaploids. Although the list includes counts from a wide cross section of the genus it is dominated by counts from the tuber-bearing species. A few species of the Australasian section *Archaeosolanum* are included and a number of the species now adventive in Australia. It can be seen from Fedorov's list that the base number for the genus is $x = 12$ and that the section *Archaeosolanum* has a base number of $x = 23$ and is anomalous in the genus. A recent account of the chromosome numbers of Australian species has been published by Henderson (1973) and Randell and Symon (1976). In the latter, nearly 100 chromosome numbers of *Solanum*, native or naturalised, are given. Table 1 summarises the counts made on native species.

Table 1. Summary of chromosome numbers of Australian species of *Solanum*

	Diploid	Diploid & Tetraploid	Tetraploid	Hexaploid
section <i>Archaeosolanum</i>				
$n = 23$	5	—	2	—
section <i>Solanum</i>				
$n = 12$	1	—	—	1
All stellate haired sections				
$n = 12$	48	9	3	—

In this account reference is frequently made to that paper, and where more than one count was made the remaining vouchers have now been indicated. Several new counts have also been added. The chromosomes of *Solanum* are relatively small and distinctive; karyotypes are hard to recognise. Cytological behaviour is regular and anomalous structures have not been recognised.

Summary of subgeneric classification of *Solanum*

Current classification of the genus has developed from the following principal works.

1. The monograph of Dunal (1852) allocated 901 species into sections, subsections and an ambiguous lower taxon. This work brought together many related species and many of his divisions have formed the basis for later work. However, as could be expected in an early work on a large genus, many errors and confusions have gradually come to light as more collections and knowledge become available. The lack of adequate keys makes Dunal's work difficult to use despite the generally detailed descriptions.
2. Dunal's monograph was followed by an important series of papers by G. Bitter between 1911-1924. He defined many new subgenera, sections, series, subseries and species. Bitter worked mainly with species from Africa and the Americas. He completed a monograph on the African species, 'Solana African' (1913-1921), but not on the genus as a whole.
3. The classification of section *Petota* of subgenus *Potatoe*, which includes the tuber-bearing species, has been developed in particular by Hawkes (1956, 1963), Correll (1962), Ochoa (1962) and Bruecher (1975), and it is at the moment the most closely worked and thoroughly understood section in the genus. Even in these recent works, with many collections and much more biological knowledge available, there are considerable differences of opinion on subgeneric limits. In the section *Petota*, then called section *Tuberarium* subsection *Hyperbasarthrum*, Correll (1962) maintains 26 series, while Hawkes (1963) maintains 17 series for the same group of species. Such is the wealth of information presented that the latest monograph to discuss part of this group of species, Hawkes and Hjerting (1969), took 525 pages and 150 plates to deal with 22 species!
4. After studying the hair forms, Seithe (1962) gave an account of the classification of the genus. This was based largely on the subgenera and sections of Bitter, with some amendments and elaborations by Seithe. Seithe's work was based on 500 species in the Munich herbarium, but it is not a revision at the species level. Seithe gave a formal description of each subgenus, section and a few subsections, and allocated a type species to each. She related the final classification to that of Dunal, and appended a list of species studied by her. These were allocated to their relevant sections or only to subgenera. Gilli (1970) prepared a key to subgenera and sections of *Solanum* based on Seithe's paper.

In practice one finds that Seithe's definitions are still somewhat broad and overlap. She used a number of vegetative characters, general habit, general leaf form, general inflorescence form, some corolla details and no fruit or seed characters. As some of these criteria are highly variable, it is relatively easy to find species which disagree in at least one character, or which, if interpreted broadly, could belong to more than one group. Inadequate use has been made of floral, fruit and seed characters and there are, I feel, more sections and series in the genus than accepted by Seithe. This applies particularly to the Australian species which Bitter did not study in detail. In Seithe's paper only 21 Australian species are allocated to subgenus or section, so that the majority of the Australian species have not yet been formally integrated into the subgeneric taxonomic structure of the genus.

5. A recent general account of the genus is that by Danert (1970). Here a key to the infra-generic taxa is given, the nomenclature of the sections is examined and the evolutionary position of the various subgenera and sections is discussed. In addition to the hair forms examined by Seithe (1962), Danert incorporates his studies of the branching characteristics of many species (Danert [1958, 1967]). While some changes in nomenclature are introduced no new sections are proposed. The infra-generic taxa are arranged by him in a proposed evolutionary sequence.

6. The most recent account of the genus is that by D'Arcy (1972). The nomenclature of the infra-generic taxa is further refined, and all validly published names between subgenus and series are listed with their relevant type species. A few new names are introduced. The infra-generic taxa are then arranged in a conspectus of the genus.

These last three studies bring together a wider evolutionary viewpoint, and most of the infra-generic nomenclature. They form a useful base for further studies, and enable the first overall view of the genus since the monograph by Dunal in 1852. However, until the great array of species in South America is better understood and adequate monographs of *Solanum* in all the continents are available, so that comparisons can be made, no fully satisfactory scheme of infra-generic taxa will be possible.

In addition to these major works, some portions of the genus have received special attention either as genera, subgenera or sections, the references to which are as follows:

- section *Acanthophora*, Nee (1979);
- section *Anarrichomenum*, Correll (1962);
- section *Androceras*, Bartlett (1909), Whalen (1976, et seq.);
- subgenus *Archaeosolanum*, Baylis (1954, 1963), Gerasimenko (1965, 1969, 1970, 1971);
- section *Basarthrum*, Correll (1962, 1967), Anderson (1975, 1977, 1979);
- section *Brevantherum*, Roe (1967, 1972, 1979);
- section *Lasiocarpum*, Heiser (1972);
- section *Leiodendron*, Morton (1944);
- genus/section *Lycianthes*, Hassler (1917), Bitter (1920), Morton (1944, 1976);
- genus *Lycopersicon*, Muller (1940), Luckwill (1943), Rick (1979);
- section *Neolycopersicon*, Correll (1962);
- section *Petota*, Correll (1952, 1962), Hawkes (1956, 1963), Ochoa (1962), Hawkes and Hjerting (1969);
- section *Solanum* (*Maurella*), Stebbins and Paddock (1949), Soria (thesis) (1958), Wesseley (1960), Heiser, Soria and Burton (1965), Gray (thesis) (1968), Edmonds (1972, 1977, 1979a), Henderson (1974), Australian species, Schilling and Heiser (1976), Heiser, Burton and Schilling (1979);
- subsection *Torvaria*, Fernald (1900).

The recent accounts of *Solanum* in various geographical areas have been of great help: Peru, McBride (1962); Catarina (Brazil); Smith and Downs (1966); Panama, D'Arcy (1973); Guatemala, Gentry (1974); Florida, D'Arcy (1974); Nouvelle-Caledonie, Heine (1976); Argentina, Morton (1976). Statistical and computational studies using *Solanum* species (mainly section *Solanum*, black nightshades) have been published by a number of authors, Soria and Heiser (1961), Heiser (1963), Heiser, Soria and Burton (1965), Jardine and Edmonds (1974), Roe (1974), Schilling and Heiser (1976), Edmonds (1977, 1978).

The present taxonomic account draws on all of the foregoing and follows none slavishly. It has been supported by much field work and the opportunity to grow many species over several years, for which I am most grateful to The University of Adelaide. The increased knowledge of many of the biological problems now evident leaves the author very much aware of how much more there is still to do. He hopes the fascination of this protean genus will stimulate continued work.

SOLANUM L.

Linnaeus, Gen. Pl. (1754) 85; Sp. Pl. (1753) 184.

Lectotype species: S. nigrum L.

Annual or perennial herbs, shrubs or small trees sometimes trailing or climbing. *Roots* fibrous, tuber-bearing or effectively rhizomatous by producing adventitious buds from widespreading shallow roots. *Plants* unarmed or with straight or curved prickles, rarely glabrous, usually pubescent with simple, branched, glandular or stellate hairs. *Leaves* very variable, usually alternate, petiolate, simple and entire, or lobed, pinnatisect or imparipinnate. *Inflorescence* terminal but usually becoming apparently lateral by the growth of an axillary bud, often extra-axillary, less commonly in the axils of the leaves or stems, or leaf opposed, a variously developed cyme, appearing racemose, subumbellate or paniculate, rarely reduced to a solitary flower. *Flowers* usually hermaphrodite but some species andromonoecious or dioecious, rarely cleistogamous. *Calyx* campanulate, rotate or cupular, mostly 5 (rarely 4-10)-toothed or lobed, sometimes enlarged to enclose the fruit. *Corolla* deeply stellate, rotate-stellate, rotate or campanulate mostly 5 (rarely 4-10)-lobed; lobes plicate in the bud, most often shades of violet, purple or blue, less often white or yellow, sometimes slightly zygomorphic. *Stamens* 5 (rarely 4), inserted on the corolla throat, alternating with the corolla lobes, usually exserted; filaments usually much shorter than the anthers; anthers oblong or lanceolate in outline, often connivent and forming a cone around the style or free and divergent, sometimes unequal with one or several anthers enlarged, opening by terminal pores or slits or splitting down the anther sac, usually conspicuously yellow. *Ovary* superior; locules 2 (rarely 3 or 4), with many ovules; style simple, erect or sigmoid; stigma usually small or slightly enlarged, capitate or bifid. *Fruit* a berry, usually globose but sometimes ovoid and rarely conical, when ripe succulent, papery or bony, rarely dry and subcapsular, pale green, yellow, orange, red, purple, black or ivory white, sometimes aromatic. *Seeds* orbicular or subreniform, compressed, often minutely pitted or reticulate, less often muricate or pubescent, pale buff to brown or black, few to many (1500) per fruit; embryo curved, submarginal; endosperm present. Stone cell concretions occur in the fruit of some species. Germination epigeal, cotyledons ovate to linear-lanceolate in shape; the first true leaves usually entire, later leaves with or without lobes and prickles.

The basic chromosome number is $n = 12$ and diploid, tetraploid and hexaploid levels occur; the section *Archaesolanum* has the base number $n = 23$, and includes both diploids and tetraploids.

^{1,2}Key to Australian species of *Solanum*

Key to groups

1. Inflorescence branched; flowers usually 20 to more than 60 GROUP I (page 18)
Inflorescence simple or forked once; flowers usually 1-20 2
2. Stellate hairs absent and prickles absent or rare 3
Stellate hairs and/or prickles present 4
3. Climbing or scrambling perennials GROUP II (page 19)
Annuals, herbaceous perennials or shrubs, not climbing GROUP III (page 20)
4. Climbing woody perennials; hairs simple; flowers 3-5 cm diam., rotate 18. *S. wendlandii*
Woody perennials or herbs, not climbing; hairs various; flowers various 5
5. Hairs predominantly simple or glandular, present at least on young growing tips and/or inflorescence GROUP IV (page 22)
Hairs predominantly stellate, present at least on young growing tips and/or inflorescence 6

¹Considerable assistance in the preparation of this key was received from Dr Rosemary Purdie, Bureau of Flora and Fauna, Canberra.

²To facilitate identification especially of incomplete specimens, the dichotomous keys are supplemented by a synoptic key within each of the eight relatively easily identified groups.

6. Prickles absent or rare GROUP V (page 24)
 Prickles variously present on stems, leaves, petioles and/or inflorescence 7
7. Flowers all male; fruits absent GROUP VI (page 27)
 At least basal flower bisexual; fruits present, one to several on each peduncle 8
8. Intact fruiting calyx surrounding or enclosing at least $\frac{3}{4}$ of berry (berry sometimes visible
 between calyx lobes or splits in calyx tube) GROUP VII (page 28)
 Intact fruiting calyx not enclosing berry GROUP VIII (page 31)

GROUP I

Plants with branched inflorescences

1. Plants with stellate hairs at least on young shoots and/or inflorescence 2
 Plants glabrous or with simple, glandular or branched hairs 15
2. Prickles absent 3
 Prickles present 7
3. Leaves glabrous or nearly so on both surfaces 4
 Leaves densely pubescent at least on lower surface 5
4. Inflorescence compact; flower pedicels 5-8 mm long; berry orange-brown when ripe .. 39. *S. dunalianum*
 Inflorescence lax; flower pedicels 1-1.5 cm long; berry red when ripe 41. *S. viride*
5. Clonal shrub; leaves discolorous, entire or shallowly lobed; flowers all male, 2.5-3 cm diam.;
 berries absent 123. *S. asymmetriphyllum*
 Shrubs or small trees; leaves slightly discolorous, entire; flowers all bisexual, 1-1.5 cm diam.;
 fruits present 6
6. Leaves with leafy pseudo-stipules at base of petiole; flowers violet 28. *S. mauritanum*
 Leaves without leafy pseudo-stipules at base of petiole; flowers white 27. *S. erianthum*
7. Leaves entire; flowers all bisexual; berries usually numerous, erect, 6-10 mm diam., orange-
 brown, red or blackish-red when ripe 8
 Leaves entire or lobed; EITHER flowers all male and fruits absent, OR at least basal flower
 bisexual, berries one to many, inclined or pendent, 8-30 mm diam., greenish, yellowish,
 reddish or blackish 9
8. Leaves discolorous; inflorescence several branched, flowers numerous (c.100),
 nodding 38. *S. giganteum*
 Leaves concolorous; inflorescence 2-branched; flowers 15-20, erect 39. *S. dunalianum*
9. Flowers stellate, white; fruits 1-1.5 cm diam., yellowish; tomentum green or rusty 10
 Flowers stellate or rotate, purplish; fruits 0.8-3 cm diam., reddish, greenish, yellowish or
 blackish; tomentum green, grey-green or yellowish-green 11
10. Mature leaves with to 7 broadly angular lobes, discolorous; stems green; flowers 2.5 cm diam.,
 pedicels with stellate and glandular hairs 37. *S. torvum*
 Mature leaves with 7-13 triangular or lanceolate lobes, concolorous; stems often rusty;
 flowers 3-4.5 cm diam., pedicels with stellate hairs 36. *S. hispidum*
11. Leaves sparsely pubescent to almost glabrous on both surfaces 12
 Leaves densely pubescent on lower surface 13
12. Flowers all bisexual, 1.5-1.8 cm diam.; berries usually several, red when ripe, not enclosed by
 calyx lobes 41. *S. viride*
 Basal flower bisexual, 4.5-5.5 cm diam.; upper flowers male, 3.5-4 cm diam.; berry solitary,
 greenish when ripe, partly enclosed by calyx lobes 116. *S. oedipus*
13. Leaves entire, upper surface densely pubescent; basal flower bisexual, upper flowers male;
 berry solitary, 3 cm diam., yellowish when ripe 108. *S. beaugleholei*
 Leaves entire or lobed, upper surface sparsely pubescent; flowers and fruits variable 14
14. Flowers all bisexual, deeply stellate, 1-1.5 cm diam.; berries usually several, 8-12 mm diam.,
 red to black when ripe 42. *S. semiarmatum*
 Flowers all male, stellate-rotate, 2.5-3 cm diam.; berries absent 123. *S. asymmetriphyllum*
15. Herbs or tuber-bearing herbaceous perennials usually less than 1 m tall; plants sometimes
 woody at base 16
 Perennial shrubs or climbers with branches to several metres long; plants woody 17
16. Leaves 3-9 cm long, more or less entire; flowers stellate; fruits blackish 4. *S. furcatum*
 Leaves 10-20 cm long, deeply 5-9 lobed; flowers more or less pentagonal-rotate; fruits
 greenish 12. *S. tuberosum*

17. At least some prickles present on stems and lower surface of leaves 18
Prickles absent 19
18. Perennial climber; leaves simple or pinnate; prickles hooked, scattered on midrib or stem;
flowers rotate, all male 18. *S. wendlandii*
Clonal shrub; leaves angularly lobed; prickles straight, abundant on stems and calyx, scattered
or absent elsewhere; flowers stellate, basal flower bisexual, upper flowers male 116. *S. oedipus*
19. Leaves usually more than 10 cm long, simple or pinnate; flowers rotate, 3-5 cm diam., all
male 18. *S. wendlandii*
Leaves usually less than 10 cm long, simple or lobed; flowers stellate, 1-3 cm diam., all bisexual 20
20. Leaves usually 3-9 lobed; fruit 10-12 mm diam.; seeds reddish-brown, shaggy-
haired 17. *S. seaforthianum*
Leaves entire, or some with 1-5 basal lobes or leaflets; berries 5-10 mm diam.; seeds not
reddish-brown, not hairy 21
21. Flowers purplish-blue, 10-12 mm diam.; berries bright red; seeds pale straw-coloured .. 13. *S. dulcamara*
Flowers white or pale blue, 2 cm diam.; berries rare, dark blue or black; seeds grey ... 16. *S. jasminoides*

Synoptic key to plants with branched inflorescences (GROUP I)

- | | | |
|-----------------------------|---------------------------|---------------------------------|
| 4. <i>S. furcatum</i> | 27. <i>S. erianthum</i> | 41. <i>S. viride</i> |
| 12. <i>S. tuberosum</i> | 28. <i>S. mauritianum</i> | 42. <i>S. semiarmatum</i> |
| 13. <i>S. dulcamara</i> | 36. <i>S. hispidum</i> | 108. <i>S. beaugleholei</i> |
| 16. <i>S. jasminoides</i> | 37. <i>S. torvum</i> | 116. <i>S. oedipus</i> |
| 17. <i>S. seaforthianum</i> | 38. <i>S. giganteum</i> | 123. <i>S. asymmetriphyllum</i> |
| 18. <i>S. wendlandii</i> | 39. <i>S. dunalianum</i> | |

1. Small trees 27, 28, 36, 37, 38, 39, 41, 123
2. Climbing plants 13, 16, 17, 18
3. Plants armed 18, 36, 37, 38, 39, 41, 42, 108, 116, 123
4. Plants unarmed 4, 12, 13, 16, 17, 18, 27, 28, 39, 41
5. Stellate hairs present 27, 28, 36, 37, 38, 39, 41, 42, 108, 116, 123
6. Simple or branched hairs 4, 12, 13, 16, 17, 18
7. Leaves entire or lobed 4, 16, 17, 18, 27, 28, 36, 37, 38, 39, 41, 42, 108, 116, 123
8. Leaves pinnate or subpinnate 12, 13, 16, 17, 18, 37
9. Flowers stellate 4, 13, 17, 27, 28, 36, 37, 38, 39, 41, 42, 116
10. Flowers rotate or pentagonal 12, 16, 18, 108, 123
11. Flowers white 4, 12, 16, 27, 36, 37
12. Flowers blue or purple 12, 13, 17, 18, 28, 38, 39, 41, 42, 108, 116, 123
13. Mature fruit greenish 12, 116, 123
14. Mature fruit yellowish 27, 28, 36, 37, 108
15. Mature fruit orange/red 13, 17, 38, 39, 41, 42
16. Mature fruit purple/black 4, 16, 42
17. Seeds pale 4, 12, 13, 17, 27, 28, 36, 37, 38, 39, 41, 42
18. Seeds dark 16, 108, 116, 123

GROUP II

Climbing or scrambling perennials without stellate hairs or prickles

1. Leaves usually more than 10 cm long, simple or pinnate; flowers rotate, 3-5 cm diam., all
male 18. *S. wendlandii*
Leaves usually less than 10 cm long, simple or lobed; flowers stellate, 1-3 cm diam., all bisexual 2
2. Leaves usually 3-9 lobed; fruit 10-12 mm diam.; seeds reddish-brown, shaggy-haired 17. *S. seaforthianum*
Leaves entire, or some with 1-5 basal lobes or leaflets; fruits 5-10 mm diam.; seeds not reddish-
brown, not hairy 3
3. Flowers purplish-blue, 10-12 mm diam.; fruits bright red; seeds pale straw-coloured 13. *S. dulcamara*
Flowers white or pale-blue, 2 cm diam.; fruits rare, dark blue or black; seeds grey 16. *S. jasminoides*

Synoptic key to climbing or scrambling perennials without stellate hairs or prickles (GROUP II)

- | | |
|---------------------------|-----------------------------|
| 13. <i>S. dulcamara</i> | 17. <i>S. seaforthianum</i> |
| 16. <i>S. jasminoides</i> | 18. <i>S. wendlandii</i> |
1. Plants with small hooked prickles 18
 2. Plants unarmed 13, 16, 17
 3. Leaves large coarse, >10 cm 18
 4. Leaves rarely 10 cm 13, 16, 17
 5. Leaves entire or with basal lobes only 13, 16, 18
 6. Leaves usually deeply and freely lobed 17
 7. Flowers 3-5 cm, rotate, male 18
 8. Flowers smaller, stellate 13, 16, 17
 9. Flowers white 16
 10. Flowers blue/purple 13, 17, 18
 11. Fruits red, common 13, 17
 12. Fruits blue/black, rare 16
 13. Fruits absent (?sterile in Aust.) 18
 14. Seeds reddish-brown, shaggy 17
 15. Seeds pale straw colour or grey, smooth 13, 16
 16. Petiole sometimes twining about support 16

GROUP III

Non-climbing plants without stellate hairs or prickles

1. Leaves 10-20 cm long, deeply lobed or with distinct leaflets; lobes broadly elliptic to broadly ovate; tuber-bearing stolons present 12. *S. tuberosum*
 Leaves less than 10 cm long, OR leaves entire, OR leaves deeply lobed; lobes linear, oblong, lanceolate or elliptic-obovate; tuber-bearing stolons absent 2
2. Flowers purplish, rotate or rotate-stellate, 2-5 cm diam.; fruits 1.5-3 cm long, reddish, orange, yellowish or greenish 3
 Flowers white or tinged purple, stellate, 0.5-2 cm diam.; fruits 0.4-1.5 cm long, purplish, blackish, orange or yellowish 17
3. Woody shrub; leaves entire; inflorescence a subumbellate cluster; fruits rare, heart-shaped, 2.5-2.75 cm diam. 19. *S. rantonnei*
 Soft-wooded shrubs; leaves entire or lobed; inflorescence usually a cyme; fruits common, never heart-shaped, to 2.5 cm diam. 4
4. Leaves mostly entire 5
 Leaves mostly lobed or undulate 11
5. Leaves linear, linear-lanceolate or narrow-elliptic, usually 0.3-1.5 cm wide, length:width ratio usually equal to or more than 10:1; petiole absent or to 1 cm long 6
 Leaves lanceolate or elliptic, 0.5-4 cm wide, length:width ratio usually equal to or less than 10:1; petiole 0.5-2 cm long 8
6. Leaf petioles 5-10 mm long, not decurrent along stem; corolla 2-3 cm diam.; mature fruit conical, less than 1 cm wide 26. *S. capsiciforme*
 Leaves sessile or shortly petiolate, petiole slightly decurrent along stem; corolla 2.5-4.5 cm diam.; mature fruit globular to slightly ovoid, 1.5-2.5 cm diam. 7
7. Fruiting pedicels mostly to 3 cm long; mature fruit 1.5-2 cm diam., ochre-yellow with purplish markings; stone cells 2-4 mm long 22. *S. linearifolium*
 Fruiting pedicels mostly 3-5 cm long; mature fruit 2-2.5 cm diam., greenish-ivory; stone cells usually 1-2 mm long 23. *S. vesicum*
8. Leaves 3-12 cm long; corolla 2-3 cm diam.; mature fruit globular, green and often tinged with purple 24. *S. simile*
 Leaves 3-25 cm long; corolla 3-5 cm diam.; mature fruit ellipsoid, obovoid or ovoid, orange-yellow, orange-red, scarlet or greenish 9
9. Leaves 3-12 cm long; mature fruit 1-1.5 cm diam., green or tinged with purple 25. *S. symonii*
 Leaves 5-25 cm long; mature fruit 1-2 cm diam., orange or reddish 10

10. Corolla lobes acute; mature fruit orange-red to scarlet; stone cells 1-1.5 mm long, inconspicuous in pressed fruit 20. *S. aviculare*
Corolla lobes notched; mature fruit orange-yellow; stone cells 1-3.5 mm long, giving pressed fruit a coarse warty appearance 21. *S. laciniatum*
11. Leaves undulate to shallowly lobed; lobes bluntly triangular 12
Leaves deeply lobed, often cut to within 1 cm of midvein; lobes linear, oblong or narrow-triangular ... 14
12. Mature fruits conical, green, less than 1 cm wide 26. *S. capsiciforme*
Mature fruits globular, ellipsoid or obovoid, 1-2 cm wide greenish and often tinged purple 13
13. Lobes at base of leaf; corolla 2-3 cm diam., violet; mature fruit globular 24. *S. simile*
Lobes along whole leaf margin; corolla 3-4 cm diam., pale purplish; mature fruit ellipsoid or obovoid 25. *S. symonii*
14. Mature fruits orange-yellow, orange-red or scarlet 15
Mature fruits yellowish or greenish, sometimes purplish in upper half 16
15. Corolla lobes acute; mature fruit orange-red to scarlet; stone cells 1-1.5 mm long, inconspicuous in pressed fruit 20. *S. aviculare*
Corolla lobes notched; mature fruit orange-yellow; stone cells 1-3.5 mm long, giving pressed fruit a coarse, warty appearance 21. *S. laciniatum*
16. Fruiting pedicels mostly to 3 cm long; mature fruit 1.5-2 cm diam., ochre-yellow with purplish markings; stone cells 2-4 mm long 22. *S. linearifolium*
Fruiting pedicels mostly 3-5 cm long; mature fruit 2-2.5 cm diam., greenish-ivory; stone cells usually 1-2 mm long 23. *S. vescum*
17. Plants prostrate; leaves deeply lobed 18
Plants erect or sprawling; leaves entire to shallowly lobed, rarely deeply lobed 19
18. Leaves 3-lobed, lobes entire; stems rooting at nodes; mature fruit yellowish-green, 4-5 mm diam. 14. *S. palitans*
Leaves 7-9-lobed, lobes toothed; stems not rooting at nodes; mature fruit marbled whitish-green, 8-12 mm diam. 15. *S. triflorum*
19. Leaves oblong-lanceolate, usually 1-2 cm wide, hairs (if present) forked; berries erect, bright orange-red, 1-2 on each peduncle; seeds 3-4 mm long 29. *S. pseudocapsicum*
Leaves ovate, ovate-lanceolate or lanceolate-elliptic, 1-8 cm wide, hairs simple or glandular; berries erect to deflexed, purple-black, reddish, yellowish or greenish, usually 2-10 on each peduncle; seeds 1-4 mm long 20
20. Woody shrub to 3 m; leaves lanceolate-elliptic, glabrous except for tufts of simple hairs in axils of veins on lower leaf surface; fruit 1-1.5 cm diam., bright orange-yellow; seeds 3-4 mm long 11. *S. callium*
Soft-wooded annual or short-lived perennial herbs, usually less than 1 m; leaves ovate or ovate-lanceolate, glabrous or with simple or glandular hairs not restricted to vein axils; fruits 0.5-1 (1.5) cm diam., purple-black greenish or reddish; seeds 1-3 mm long 21
21. Fruiting peduncle sharply deflexed from its base 22
Fruiting peduncle erect, ascending or curved downwards 23
22. Leaves slightly discolorous, whitish on lower surface; mature berry 5-9 mm diam., blackish; fruiting calyx lobes 3-4 mm long 5. *S. chenopodioides*
Leaves concolorous, green on lower surface; mature berry 8-10 mm diam., green; fruiting calyx lobes 1-2.5 mm long 2. *S. opacum*
23. Inflorescence forked; berry purplish black 4. *S. furcatum*
Inflorescence simple; berry blackish, greenish or reddish 24
24. Plants sprawling; mature berry greenish 25
Plants more or less erect; mature berry blackish or reddish 26
25. Pubescence of glandular hairs; fruiting calyx lobes 2-4 mm long, 2-5 mm wide; berry 5-8 mm diam. 8. *S. sarrachoides*
Pubescence predominantly of simple hairs; fruiting calyx lobes 1-2.5 mm long, 1-2 mm wide; berry 8-10 mm diam. 2. *S. opacum*
26. Mature berry dull orange-red, subglobose, slightly longer than broad, translucent; plant densely pubescent with erect, glandular hairs or sparsely pubescent with curved simple hairs 10. *S. villosum*
Mature berry black or purplish black, globular, opaque; plants usually sparsely pubescent with appressed, simple hairs, or rarely with glandular hairs 27

27. Mature berry surface shiny; seeds 1-2.8 mm long, usually many (<40) in each fruit 28
 Mature berry surface dull; seeds 1.5-2 mm long, usually c. 20-40 in each fruit 29
28. Berries 6-9 mm diam., usually 1-4 on each peduncle; seeds 1-1.5 mm long 1. *S. americanum*
 Berries 10-15 mm diam., usually 4-10 on each peduncle; seeds 2-2.8 mm long 9. *S. scabrum*
29. Stigma exceeding anther tips by 2-3 mm; corolla 10-20 mm diam. 30
 Stigma exceeding anther tips at most by 1 mm; corolla 8-12 mm diam. 31
30. Corolla often flushed purple, 10-15 mm diam.; stone cells less than 0.5 mm wide 3. *S. douglasii*
 Corolla white with yellowish centre, 15-20 mm diam.; stone cells 1-1.2 mm wide 4. *S. furcatum*
31. Leaves concolorous, green or purplish-green, entire to shallowly lobed; fruiting axis with several short, distinct internodes; berries often more than 5 on each peduncle 6. *S. nigrum*
 Leaves discolorous, green, distinctly lobed or toothed; fruiting axis with only one distinct internode; berries usually up to 5 on each peduncle 7. *S. retroflexum*

Synoptic key to non-climbing plants without stellate hairs or prickles (GROUP III)

- | | | |
|-----------------------------|-------------------------|------------------------------|
| 1. <i>S. americanum</i> | 9. <i>S. scabrum</i> | 21. <i>S. laciniatum</i> |
| 2. <i>S. opacum</i> | 10. <i>S. villosum</i> | 22. <i>S. linearifolium</i> |
| 3. <i>S. douglasii</i> | 11. <i>S. callium</i> | 23. <i>S. vescum</i> |
| 4. <i>S. furcatum</i> | 12. <i>S. tuberosum</i> | 24. <i>S. simile</i> |
| 5. <i>S. chenopodioides</i> | 14. <i>S. palitans</i> | 25. <i>S. symonii</i> |
| 6. <i>S. nigrum</i> | 15. <i>S. triflorum</i> | 26. <i>S. capsiciforme</i> |
| 7. <i>S. retroflexum</i> | 19. <i>S. rantonnei</i> | 29. <i>S. pseudocapsicum</i> |
| 8. <i>S. sarrachoides</i> | 20. <i>S. aviculare</i> | |
1. Soft wooded small trees 11, 20, 21
 2. Soft wooded large shrubs 19, 20-26, 29
 3. Annuals or herbaceous perennials 1-10, 12, 14, 15
 4. Leaves deeply lobed 12, 14, 15, 20, 21, 22, 23
 5. Flowers stellate 1-11, 14, 15, 20, 29
 6. Flowers rotate 12, 19, 20-26
 7. Flowers white 1-15, 29
 8. Flowers blue/purple 19, 20-26
 9. Ripe fruits greenish 2, 8, 12, 14, 15, 23, 24, 25, 26
 10. Ripe fruit yellowish 10, 11, 14, 21, 22
 11. Ripe fruits red 10, 11, 19, 20, 29
 12. Ripe fruits purple/black 1-7, 9
 13. Stone cells abundant (>10) 20-26
 14. Stone cells few (<10) 1, 2, 4, 8, 15, 19
 15. Stone cells absent 3, 5, 6, 7, 9, 10, 11, 12, 14, 29
 16. Fruits >1 cm diam. 11, 12, 19-25, 29
 17. Fruits <1 cm diam. 1-10, 14, 15
 18. Fruit conical 26

GROUP IV

Plants with prickles and simple or glandular (non-stellate) hairs

1. Flowers deeply stellate; leaves broadly ovate or orbicular in outline, usually 10-15 cm wide; fruits 2-3.5 cm or more diam., yellow, orange or red when ripe 2
 Flowers campanulate, broadly stellate or rotate; leaves ovate or elliptic in outline, 1-10 cm wide; fruits 1-2.5 cm diam., usually greenish, yellowish or whitish when ripe 3
2. Flowers white, 2-3 cm diam.; fruits globular, 2-3.5 cm long; seeds pale yellowish or brownish, with wing 1.5 mm wide 31. *S. capsicoides*
 Flowers pale purplish, 3-4 cm diam.; fruits with nipple-like apex and often with basal lobes, 3-6 cm long; seeds dark purplish, not winged 32. *S. mammosum*

3. Fruiting calyx largely enclosing berry, tube sometimes splitting to expose fruit 4
Fruiting calyx not enclosing berry 7
4. Berry enclosed by calyx tube; plants sprawling, stems to 30 cm long; flowers all bisexual 5
Berry enclosed by calyx lobes; plants erect or sprawling, to 3 m; flowers all bisexual or basal
flower bisexual, upper ones male 6
5. Leaves 3-8 cm long, more or less glabrous 93. *S. hystrix*
Leaves 4-15 cm long, pubescent with simple and glandular hairs, hairs denser on lower
surface 94. *S. hoplopetalum*
6. Flowers all bisexual; corolla 2 cm diam.; mature berry 10-15 mm diam.; seeds 2-2.5 mm long,
pale yellowish 91. *S. cookii*
Basal flower bisexual, upper ones male; corolla 3.5-5.5 cm diam.; mature berry 15-20 mm
diam.; seeds 4-4.5 mm long, black 116. *S. oedipus*
7. Calyx with 1-2 large prickles on outer side of flower or fruit cluster; flowers campanulate,
c. 1 cm diam.; fruits greenish; seeds papery, 3-3.5 mm long 30. *S. pugiunculiferum*
Large spines absent from outer side of calyx; flowers broadly stellate to pentagonal, 2-4 cm
diam.; fruits yellowish or whitish; seeds not papery, less than 3 mm long 8
8. Leaves more or less glabrous, deeply 5-11-lobed, lobes cut more than $\frac{2}{3}$ way to midvein;
petiole 1-3 cm long 66. *S. papaverifolium*
Leaves pubescent, shallowly 7-9-lobed, lobes cut no more than $\frac{2}{3}$ way to midvein; petiole 2-6 cm long ... 9
9. Leaves 8-15 cm long; flowering peduncle 1.5-2 cm long, flowering pedicel 3-8 mm long 91. *S. cookii*
Leaves 3-6 cm long; flowering peduncle to 1 cm long, flowering pedicel c. 2 cm long . 67. *S. adenophorum*

Synoptic key to plants with prickles and simple or glandular (non-stellate) hairs
(GROUP IV)

- | | | |
|-------------------------------|------------------------------|----------------------------|
| 30. <i>S. pugiunculiferum</i> | 66. <i>S. papaverifolium</i> | 93. <i>S. hystrix</i> |
| 31. <i>S. capsicoides</i> | 67. <i>S. adenophorum</i> | 94. <i>S. hoplopetalum</i> |
| 32. <i>S. mammosum</i> | 91. <i>S. cookii</i> | 116. <i>S. oedipus</i> |
- (*S. adenophorum*, *S. hoplopetalum*, *S. oedipus* may have sparse and obscure stellate hairs).

1. Shrubs or undershrubs 31, 32, 91, 116
2. Herbaceous perennials 66, 67, 93, 94
3. Annuals 30, 731, 732
4. Stem prickles broadly flattened 32
5. Stem prickles not broadly flattened 30, 31, 66, 67, 91, 93, 94, 116
6. Longest prickles usually less than 8 mm 66, 67
7. Longest prickles usually more than 10 mm 30, 31, 32, 91, 93, 94, 116
8. Leaves glabrous or almost so 30, 66, 93, 116
9. Leaves with conspicuous hairs or glands 31, 32, 67, 91, 94
10. Leaves with up to 17 more or less even triangular lobes 91, 116
11. Leaves with 5-9 principal lobes 30, 31, 32, 66, 67, 93, 94
12. Leaves cut $< \frac{1}{3}$ way to midrib 67, 91, 116
13. Leaves cut $> \frac{1}{3}$ and $< \frac{2}{3}$ way to midrib 31, 32, 67, 93, 94
14. Leaves cut $> \frac{2}{3}$ way to midrib 30, 66, 93
15. Flowers stellate 31, 32, 91, 116
16. Flowers rotate 30, 66, 67, 93, 94
17. Flowers white 31, 93, 94
18. Flowers blue/purple 30, 32, 66, 67, 91, 116
19. Calyx accrescent enveloping berry 93, 94, 116
20. Calyx not accrescent 30, 31, 32, 66, 67, 91
21. Fruits orange or scarlet 31, 32
22. Fruits greenish, flushed purple or dull yellowish 30, 66, 67, 91, 93, 94, 116
23. Fruits > 2 cm diam. 31, 32, 93, 94, 116
24. Fruits < 2 cm diam. 30, 66, 67, 91, 93
25. Seeds pale-buff or amber 31, 66, 67, 91
26. Seeds dark-grey to black 30, 93, 94, 116
27. Seeds dull dark reddish 32

GROUP V*Plants with stellate hairs and few or no prickles*

1. Flowers all male; fruits absent 2
At least basal flower bisexual; fruits present, one to several on each peduncle 8
2. Leaves entire 3
Leaves lobed 7
3. Leaves linear-lanceolate 124. *S. tudununggae*
Leaves lanceolate to elliptic or to ovate 4
4. Leaves silvery or rusty 5
Leaves green 6
5. Leaves ovate to elliptic, rusty or silvery, concolorous, 1-5 cm wide 117. *S. dioicum*
Leaves lanceolate-elliptic, rusty, discolorous, 1-2 cm wide 118. *S. cunninghamii*
6. Leaves ovate to elliptic, discolorous; calyx more or less 2-lipped 123. *S. asymmetriphyllum*
Leaves ovate to lanceolate, concolorous or slightly discolorous; calyx not 2-lipped 125. *S. vansittartensis*
7. Lobes linear, cut almost to midvein 124. *S. tudununggae*
Lobes triangular, cut less than $\frac{1}{2}$ way to midvein 123. *S. asymmetriphyllum*
8. Inflorescence forked 9
Inflorescence simple 14
9. Mature leaves more or less glabrous on both surfaces, or with hairs along veins; some hairs present on young shoots and inflorescence; mature berry orange-red or red 10
Mature leaves densely pubescent at least on lower surface; mature berry yellow 11
10. Flowering pedicels 5-8 mm long; corolla 2-3 cm diam.; mature berry orange-red 39. *S. dunalianum*
Flowering pedicels 1-1.5 cm long; corolla 1.5-2 cm diam.; mature berry red 41. *S. viride*
11. Scrambling shrub; upper leaf surface sparsely pubescent; flower pedicels with stellate and glandular hairs 37. *S. torvum*
Erect shrubs, small trees or herbaceous perennials; upper leaf surface densely to moderately densely pubescent; flower pedicels with stellate hairs only 12
12. Clonal, herbaceous perennial; leaves 5-12 cm long, lobed; mature berry 15-20 mm diam. 53. *S. dimidiatum*
Erect shrubs or small trees; leaves 10-30 cm long, entire; mature berry 10-15 mm diam. 13
13. Leaves with leafy pseudo-stipules at base; corolla violet 28. *S. mauritianum*
Leaves without leafy pseudo-stipules at base; corolla white 27. *S. erianthum*
14. Inflorescence a solitary bisexual flower, or one bisexual flower at base of cyme of male flowers; fruits solitary 15
Flowers all bisexual, rarely lower ones bisexual and upper ones male; fruits one to several on each peduncle 21
15. Mature berry more than 10 cm long and wide, not enclosed by calyx 106. *S. melongena*
Mature berry 1.5-2.5 cm diam., enclosed by enlarged calyx 16
16. Leaves mostly lobed 17
Leaves mostly entire 18
17. Leaves deeply lobed, lobes more or less linear, cut almost to midvein 124. *S. tudununggae*
Leaves shallowly lobed, lobes triangular, cut less than half way to midvein ... 123. *S. asymmetriphyllum*
18. Leaves linear-lanceolate 124. *S. tudununggae*
Leaves lanceolate to elliptic or to ovate 19
19. Fruiting pedicel to 0.5-1.5 cm long, more or less erect; fruit splitting around circumference to form a loose cap 125. *S. vansittartensis*
Fruiting pedicel 1.5-2.5 cm long, deflexed or nodding; berry not splitting around circumference 20
20. Leaves 1-2 cm wide; corolla 2-3 cm diam. 118. *S. cunninghamii*
Leaves 2-7 cm wide; corolla 4-6 cm diam. 123. *S. asymmetriphyllum*
21. Berry enclosed by enlarged calyx tube 22
Berry not enclosed by enlarged calyx tube 23
22. Inflorescence usually more than 3-flowered; anthers opening by longitudinal slits; fruiting calyx 7-10 mm diam. 80. *S. karsensis*
Inflorescence 1-3 flowered; anthers opening by terminal pores; fruiting calyx 10-15 mm diam. 86. *S. gilesii*

23. Leaves sparsely pubescent to more or less glabrous on upper surface24
 Leaves densely to moderately densely pubescent on upper surface40
24. Leaves sparsely pubescent to more or less glabrous on lower surface; mature berry red or orange-red25
 Leaves moderately pubescent to densely pubescent on lower surface; mature berry red, yellowish or greenish29
25. Mature berry 15-20 mm diam.26
 Mature berry 5-10 mm diam.27
26. Leaves elliptic; mature leaves with hairs sparsely scattered along veins or rarely scattered over lower surface; mature berry orange-red 95. *S. macoorai*
 Leaves ovate; mature leaves with hairs sparsely scattered over both surfaces, rarely denser on lower surface; mature berry scarlet red 96. *S. sporadotrichum*
27. Flowering pedicels 1-1.5 cm long; corolla 1.5-2 cm diam., 5-lobed; mature berry red 41. *S. viride*
 Flowering pedicels 4-8 mm long; corolla 2-3 cm diam., 4-5-lobed; mature berry red or orange-red28
28. Leaves broadly elliptic or ovate; length:width less than 2:1; corolla white or pale blue ..40. *S. tetrandrum*
 Leaves elliptic, length:width more than 2:1; corolla violet 39. *S. dunalianum*
29. Mature berry red30
 Mature berry yellowish or greenish36
30. Leaves with 2-4 basal lobes31
 Leaves entire or lobed along whole margin.32
31. Corolla 3 cm diam., purple or heliotrope; berry 10-15 mm diam. 51. *S. elegans*
 Corolla 1-2 cm diam., pale lilac or white; berry 5-9 mm diam. 52. *S. chenopodium*
32. Inflorescence usually opposite leaf; lower flowers bisexual, upper ones male; seeds 4-5 mm long, hairy 47. *S. yirrkalensis*
 Inflorescence usually from internode; flowers all bisexual; seeds 1.5-3.5 mm long, glabrous33
33. Mature berry 10-15 mm diam.; lower leaf surface pubescent with minute, stellate hairs; hairs whitish, pale yellowish or silvery34
 Mature berry 5-10 mm diam.; lower leaf surface pubescent or woolly pubescent with stellate hairs; hairs brownish, pale yellowish or pale greenish35
34. Corolla deeply stellate, 2 cm diam.; leaves elliptic, length:width usually less than 3:1 ... 46. *S. corifolium*
 Corolla broadly stellate, 2.5-3 cm diam.; leaves linear to lanceolate, length:width usually more than 3:1 51. *S. elegans*
35. Leaves broadly elliptic or ovate, length:width usually less than 2:1; corolla usually 4-partite; flowering pedicels 4-5 mm long; fruiting pedicels 7-13 mm long40. *S. tetrandrum*
 Leaves lanceolate-elliptic, length:width usually more than 2:1; corolla 5-partite; flowering pedicels 1-2 cm long; fruiting pedicels 1.5-3 cm long 43. *S. stelligerum*
36. Scrambling shrub; corolla deeply stellate, white 37. *S. torvum*
37
37. Corolla deeply stellate; lower flowers bisexual, upper ones male; berry broadly ovoid ... 98. *S. dallachii*
 Corolla stellate to rotate; all flowers bisexual; berry globular or depressed globular.38
38. Lower leaf surface densely woolly pubescent, pale yellowish or pale greenish; seeds 2.5-3.5 mm long 100. *S. brownii*
 Lower leaf surface moderately woolly pubescent or not woolly pubescent, bright yellow, rusty, yellowish-green or pale greenish; seeds 1.5-3 mm long39
39. Shrub to 2 m; leaves usually more than 2 cm wide, length:width less than 2.5:1; tomentum on lower leaf surface bright yellow, rarely rusty; mature berry 15-20 mm diam. ... 99. *S. furfuraceum*
 Subshrub to 0.6 m; leaves usually less than 2 cm wide, length:width more than 2.5:1; tomentum on lower leaf surface yellowish-green or pale greenish; mature berry 10-15 mm diam. 64. *S. tetrathecum*
40. Mature berry 5-8 mm diam., red41
 Mature berry yellowish, greenish, orange, brownish or blackish, 5-20 mm diam.42
41. Leaf length:width usually less than 2.5:1; fruiting pedicel 10-15 mm long, hirsute-villous; fruiting calyx lobes 6-15 mm long 49. *S. densevestitum*
 Leaf length:width usually equal to or more than 2.5:1; fruiting pedicel 6-10 mm long, woolly; fruiting calyx lobes usually 5-8 mm long 50. *S. nemophilum*
42. Mature fruit dry, brown or blackish43
 Mature fruit mucilaginous, yellowish, greenish or orange-brown44

43. Plants rusty or yellowish-green; leaves concolorous; dry fruit brown, raisin-like; seeds pale brownish 60. *S. centrale*
Plants silvery-green or grey-green; leaves discolorous; dry fruit blackish, skin brittle; seeds blackish 78. *S. sturtianum*
44. Leaves orbicular 55. *S. orbiculatum*
Leaves not orbicular 45
45. Mature leaves distinctly lobed, lobes cut $\frac{1}{4}$ or more of way to midvein, OR leaves plicately folded 46
Leaves entire to shallowly lobed, lobes cut less than $\frac{1}{4}$ way to midvein 49
46. Leaves 5-8 mm wide, margin plicately folded 58. *S. plicatile*
Leaves more than 10 mm wide, margin lobed but not folded 47
47. Leaves green, lobes broadly triangular to oblong; axis of inflorescence 2-5 cm long; berry 15-20 mm diam. 53. *S. dimidiatum*
Leaves green or rusty-green, lobes rounded; axis of inflorescence 0.5 cm long; berry 5-10 mm diam. 57. *S. oldfieldii*
48. Leaves shallowly lobed, lobes angular or rounded 49
Leaves entire to slightly undulate 51
49. Corolla rotate-pentagonal, 3-4 cm diam.; young shoots and inflorescence usually rusty-green 57. *S. oldfieldii*
Corolla rotate-stellate, 1.5-3 cm diam.; young shoots usually grey-green or silvery-green 50
50. Leaves usually silvery-green, rarely rusty; flowering peduncle to 1 cm long; anthers 5-8 mm long 54. *S. elaeagnifolium*
Leaves usually grey-green; flowering peduncle 1-4 cm long; anthers 4-5 mm long 52. *S. esuriale*
51. Leaves ovate, usually more than 2 cm wide 52
Leaves lanceolate to oblong, less than 2 cm wide 54
52. Herbaceous perennials to 10 cm; flowering pedicel 1.5-2.5 cm long 70. *S. terraneum*
Woody shrubs to 1.5 m; flowering pedicels to 1 cm long 53
53. Leaves grey-green; berry 10-15 mm diam.; seeds 2-3 mm long 55. *S. orbiculatum*
Leaves green or rusty-green; berry 5-10 mm diam.; seeds 1-2 mm long 57. *S. oldfieldii*
54. Leaves silvery-green, rarely rusty-green or greyish-green; anthers usually 5-8 mm long 55
Leaves grey-green, rusty-green or green; anthers 3-6 mm long 56
55. Flowers 5-partite; flowering calyx lobes awl-shaped; mature berry orange-brown .. 54. *S. elaeagnifolium*
Flowers 4- or 5-partite; flowering calyx lobes triangular; mature berry yellow or yellowish-brown 59. *S. coactiliferum*
56. Leaves usually rusty-green, rarely green; seeds 1-2 mm long 57
Leaves greyish-green or dark green; seeds 2-3 mm long 58
57. Flowering calyx 6-10 mm long, lobes oblong to obovate; corolla rotate-pentagonal, 2.5-4 cm diam. 57. *S. oldfieldii*
Flowering calyx 4-6 mm long, lobes bluntly triangular; corolla broadly stellate, 2-2.5 cm diam. 61. *S. hesperium*
58. Subshrub to 60 cm; flowering peduncle to 1 cm long; berry never with an acute tip; seeds light grey 64. *S. tetraethecum*
Herbaceous perennial to 30 cm; flowering peduncle 1-4 cm long; berry often with acute tip; seeds yellowish 59
59. Leaves oblong; flowering peduncle 1-4 cm long; flower pedicel 1-1.5 cm long; flowering calyx lobes linear or narrow-triangular, 2-3 mm long 62. *S. esuriale*
Leaves linear-oblong; flowering peduncle 1-1.5 cm long; flower pedicel to 1 cm long; flowering calyx lobes triangular, 1-1.5 mm long 63. *S. tumulicola*

Synoptic key to plants with stellate hairs and few or no prickles (GROUP V)

- | | | |
|-----------------------------|------------------------------|--------------------------------|
| 27. <i>S. erianthum</i> | 50. <i>S. nemophilum</i> | 70. <i>S. terraneum</i> |
| 28. <i>S. mauritianum</i> | 54. <i>S. elaeagnifolium</i> | 78. <i>S. sturtianum</i> |
| 39. <i>S. dunalianum</i> | 57. <i>S. oldfieldii</i> | 98. <i>S. dallachii</i> |
| 40. <i>S. tetrandrum</i> | 60. <i>S. centrale</i> | 100. <i>S. brownii</i> |
| 41. <i>S. viride</i> | 61. <i>S. hesperium</i> | 106. <i>S. melongena</i> |
| 47. <i>S. yirrkalensis</i> | 62. <i>S. esuriale</i> | 118. <i>S. cunninghamii</i> |
| 49. <i>S. densevestitum</i> | 63. <i>S. tumulicola</i> | 125. <i>S. vansittartensis</i> |

1. Small trees, large shrubs 27, 28, 39, 41, 98, 100, 125
2. Small or medium shrubs 40, 47, 49, 50, 57, 61, 78, 100, 118, 125
3. Herbaceous perennials 54, 60, 62, 63, 70, 106
4. Leaves > 10 cm 27, 28, 39, 40, 41, 98, 106
5. Leaves entire 27, 28, 39, 40, 41, 49, 50, 54, 60, 61, 62, 63, 70, 78, 98, 100, 106, 118, 125
6. Leaves shallowly lobed 47, 54, 57, 62, 98, 106
7. Tomentum rusty 54, 57, 60, 61, 100, 118, 125
8. Flowers stellate 27, 28, 39, 40, 41, 47, 49, 50, 54, 60, 61, 62, 63, 70, 98
9. Flowers rotate 57, 78, 100, 106, 118, 125
10. Flowers white, not purple/blue 27, 40, 47
11. Flowers 4-partite 39, 40, 62, 63, 70
12. Fruits greenish 70, 98, 100, 118, 125
13. Fruits yellowish 27, 28, 54, 57, 60, 61, 62, 63, 78, 100, 118, 125
14. Fruits orange-red 39, 40, 41, 47, 49, 50
15. Fruits > 1.5 cm diam. 98, 100, 106, 118, 125
16. Fruits erect 27, 28, 39, 40, 78
17. Fruits enclosed in calyx 49, 118, 125
18. Seeds dark, near black 78, 118, 125

GROUP VI

Plants all male

1. Leaves entire 2
Leaves lobed 7
2. Leaves linear-lanceolate, to 0.8-1.5 cm wide, concolorous or slightly discolorous 3
Leaves lanceolate to elliptic or to ovate, 1-7 cm wide, concolorous to discolorous 4
3. Leaves dark greyish-green; corolla 1.5-2 cm diam., pale lavender 119. *S. petraeum*
Leaves silvery; corolla 3-4.5 cm diam., purple 124. *S. tudununggae*
4. Leaves rusty or silvery 5
Leaves green 6
5. Leaves concolorous, ovate to elliptic, rusty or silvery, 1-5 cm wide 117. *S. dioicum*
Leaves discolorous, lanceolate-elliptic, rusty, 1-2 cm wide 118. *S. cunninghamii*
6. Leaves ovate to elliptic, distinctly discolorous; calyx more or less 2-lipped ... 123. *S. asymmetriphyllum*
Leaves ovate to lanceolate, concolorous or slightly discolorous; calyx not 2-lipped 125. *S. vansittartensis*
7. Lobes cut almost to midrib 8
Lobes cut no more than half way to midrib 10
8. Lobes 3-5, oblong to broadly triangular 121. *S. carduiforme*
Lobes 4-14, linear 9
9. Leaves 9-25 cm long, silvery; lobes 4-8, 1-17 cm long, 5-10 mm wide 124. *S. tudununggae*
Leaves 3-6 cm long, green; lobes 6-14, 0.2-2.0 cm long, 1-3 mm wide 120. *S. cataphractum*
10. Leaves green, concolorous, with 6-14 tooth-like or narrowly triangular lobes 11
Leaves drab green, concolorous or discolorous, with 5-7 broadly triangular lobes 123. *S. asymmetriphyllum*
11. Leaves pubescent with minute stellate and glandular hairs, lobes triangular 122. *S. leopoldensis*
Leaves more or less glabrous, glandular hairs absent, lobes narrowly linear 120. *S. cataphractum*

Synoptic key to plants all male (GROUP VI)

- | | | |
|-----------------------------|-----------------------------|---------------------------------|
| 117. <i>S. dioicum</i> | 120. <i>S. cataphractum</i> | 123. <i>S. asymmetriphyllum</i> |
| 118. <i>S. cunninghamii</i> | 121. <i>S. carduiforme</i> | 124. <i>S. tudununggae</i> |
| 119. <i>S. petraeum</i> | 122. <i>S. leopoldensis</i> | 125. <i>S. vansittartensis</i> |
1. Leaves more or less entire 117, 118, 119, 123, 125
 2. Leaves shallowly lobed 122, 123
 3. Leaves deeply lobed 120, 121, 124

4. Prickles sparse 118, 123, 124
5. Prickles abundant 117, 119, 120, 121, 122, 125
6. Leaves more or less glabrous above 117, 120, 122, 123
7. Leaves densely pubescent above 117, 118, 119, 121, 124, 125
8. Leaves silvery below 123, 124

GROUP VII

Plants with berry enclosed in calyx

1. Berry mostly enclosed in or surrounded by calyx lobes 2
Berry enclosed mostly by enlarged calyx tube 12
2. Mature berry red; fruiting calyx lobes more or less elliptic, oblong or broadly triangular 3
Mature berry greenish, yellowish or whitish; fruiting calyx lobes linear, narrowly triangular, lanceolate or broadly triangular 5
3. Flowers 3.5-5 cm diam., white or pale blue; berry 15-20 mm diam.; fruiting calyx prickly 35. *S. sisymbriifolium*
Flowers 2-3 cm diam., violet or purplish; berry 5-8 mm diam.; fruiting calyx not prickly 4
4. Leaves 3.5-12 cm long, length:width usually less than 2.5:1; fruiting pedicel 10-15 mm long; fruiting calyx lobes 6-15 mm long 49. *S. densevestitum*
Leaves 2-6 cm long, length:width usually equal to or more than 2.5:1; fruiting pedicel 6-10 mm long; fruiting calyx lobes 5-8 mm long 50. *S. nemophilum*
5. All parts pubescent with stellate and glandular hairs; flowers campanulate, 1.5-2 cm long; berry 2-2.5 cm diam. 103. *S. campanulatum*
Glandular hairs absent or confined to calyx of bisexual flower; flowers broadly stellate to rotate or rotate-pentagonal, diam. variable; berry 1-4 cm diam. 6
6. Flower all bisexual; fruits numerous on each peduncle, becoming hard and bony 7
Basal flower bisexual, other flowers male; fruits solitary, not hard and bony 8
7. Leaves usually rusty-green, concolorous, undulate to shallowly lobed; inflorescence to 22-flowered; berry 10-15 mm diam. 82. *S. eardleyae*
Leaves usually grey-green, slightly to distinctly discolorous, shallowly to deeply lobed; inflorescence to 10-flowered; berry usually 8-10 mm diam. 87. *S. petrophilum*
8. Glandular hairs present on calyx of bisexual flower; mature berry 1.5-2 cm diam., slightly bilobed 116. *S. oedipus*
Glandular hairs usually absent from calyx of bisexual flower; mature berry 2-4 cm diam., globular or ellipsoid 9
9. Fruiting calyx lobes triangular to broadly angular, to 1-2 cm long; leaves entire 108. *S. beaugleholei*
Fruiting calyx lobes narrowly triangular, linear, or triangular with a linear tip, 2-5 cm long; leaves entire or lobed 10
10. Pubescence bright yellowish-green; pedicel of bisexual flower 2.5-4 cm long; fruiting calyx lobes 2.5-5 cm long, finally becoming reflexed 112. *S. clarkiae*
Pubescence usually grey-green, rarely rusty-green or yellowish-green; pedicel of bisexual flower 1-2 cm long; fruiting calyx lobes 2-3 cm long, never reflexed 11
11. Leaves more or less entire; bisexual flower 4-5 cm diam., male flowers 3-4 cm diam.; fruiting pedicel to 2.5 cm long 109. *S. phlomoides*
Leaves entire or lobed; bisexual flower 3-3.5 cm diam., male flowers 2-2.5 cm diam.; fruiting pedicel 2.5-5.5 cm long 110. *S. chippendalei*
12. Leaves entire to slightly undulate 13
Leaves lobed 29
13. Flower and fruit always solitary 14
Flowers 2-15 on each peduncle; fruits usually more than one on each peduncle 19
14. Leaves lanceolate or linear-lanceolate, 8-15 mm wide, concolorous or slightly discolorous 15
Leaves lanceolate to elliptic or to ovate, 1-7 cm wide, concolorous to distinctly discolorous 16
15. Leaves dark greyish-green; calyx densely prickly; corolla 2-3 cm diam., lavender; berry not splitting around circumference 119. *S. petraeum*
Leaves silvery; calyx with scattered prickles; corolla to 5 cm diam., purple; fruit splitting around circumference to form a loose cap 124. *S. tudununggae*

16. Fruiting pedicel to 1.5 cm long, erect; fruit splitting around circumference to form a loose cap..... 125. *S. vansittartensis*
 Fruiting pedicel 1.5-3 cm long, more or less deflexed or nodding; berry not splitting around circumference..... 17
17. Leaves lanceolate-elliptic, 1-2 cm wide, discolorous 118. *S. cunninghamii*
 Leaves ovate to elliptic, 1-7 cm wide, concolorous or discolorous 18
18. Leaves rusty or silvery, concolorous; calyx densely prickly 117. *S. dioicum*
 Leaves green, discolorous; calyx with scattered prickles 123. *S. asymmetriphyllum*
19. Stems prostrate or sprawling 20
 Stems more or less erect 22
20. Leaves distinctly discolorous; inflorescence 6-15-flowered; fruiting peduncle and axis 5-17 cm long, usually with 3-10 fruits 76. *S. lucani*
 Leaves slightly discolorous; inflorescence 2-8-flowered; fruiting peduncle and axis 2-6 cm long, usually with 1-4 fruits 21
21. Leaves 1-4 cm wide, bright rusty-green or rarely grey-green; fruiting calyx 1-1.5 cm diam.; berry depressed-globular, squarish in outline..... 75. *S. echinatum*
 Leaves 3-9 cm wide, grey-green; fruiting calyx 2-2.5 cm diam.; berry globular, round in outline..... 77. *S. seitheae*
22. Anthers opening by longitudinal slits; fruiting calyx 7-10 mm diam., prickles on calyx rare or absent; seeds 4-5 mm long 80. *S. karsensis*
 Anthers opening by terminal pores; fruiting calyx 10-20 mm diam., prickles scattered to dense; seeds less than 4 mm long 23
23. Pubescence on leaves and/or young shoots and calyx bright rusty or orange-brown 24
 Pubescence on leaves and young shoots grey-green, yellowish-green or whitish 25
24. Inflorescence 1-5 cm long, 2-5-flowered; peduncle to 4 cm long; berry depressed globular, squarish in outline 75. *S. echinatum*
 Inflorescence short, 1-2-flowered; peduncle to 5 mm long; berry globular, circular in outline..... 86. *S. gilesii*
25. Pubescence yellowish-green, hairs all or mostly glandular-stellate 26
 Pubescence grey-green or whitish, stellate hairs not glandular..... 27
26. All parts silky-pubescent; flowers, all bisexual; fruiting calyx densely pubescent, usually globular and enclosing whole fruit, pedicel 10-15 mm long 88. *S. gabrielae*
 All parts woolly pubescent; lower flowers bisexual, upper ones male; fruiting calyx sparsely pubescent, not globular, upper part of fruit exposed, pedicel (1.0) 1.5-2 cm long ... 87. *S. ashbyae*
27. Pubescence whitish, densely woolly on all parts; corolla shallowly campanulate; anthers 7-8 mm long; fruiting peduncle and axis less than 3 cm long usually 84. *S. lachnophyllum*
 Pubescence grey-green, dense but not woolly on all parts; corolla not shallowly campanulate; anthers 4-6 mm long; fruiting peduncle and axis 3-9 cm long 28
28. Leaves concolorous, berry globular or ovoid rarely conical, yellowish; fruiting calyx almost woolly-pubescent 85. *S. lasiophyllum*
 Leaves slightly discolorous; berry depressed-globular, squarish in outline, pale ivory-green; fruiting calyx not woolly-pubescent 75. *S. echinatum*
29. Flowers yellow, zygomorphic; berries erect, dry and papery, several on each peduncle .. 34. *S. rostratum*
 Flowers purplish, regular; berries usually pendent, usually fleshy, one to several on each peduncle, not dry and papery 30
30. Flower solitary, rarely flowers numerous with basal one bisexual and upper ones male; fruit always solitary 31
 Flowers 1-15 on each peduncle, usually all bisexual; fruits 1-several on each peduncle..... 39
31. Leaves deeply lobed, lobes cut almost to midvein 32
 Leaves shallowly lobed, lobes cut no more than 1/2 way to midvein 34
32. Lobes 3-5, oblong to broadly triangular 121. *S. carduiforme*
 Lobes 4-14, linear 33
33. Leaves 3-6 cm long, green; lobes 6-14, 0.2-2 cm long, 1-3 mm wide 120. *S. cataphractum*
 Leaves 9-25 cm long, silvery; lobes 4-8, 1-17 cm long, 5-10 mm wide..... 124. *S. tudununggae*
34. Leaves green, concolorous, lobes tooth-like or narrowly triangular 35
 Leaves drab green or grey-green, concolorous to discolorous; lobes oblong, rounded or broadly triangular 36

35. Leaves pubescent with minute stellate and glandular hairs 122. *S. leopoldensis*
 Leaves more or less glabrous; glandular hairs absent 120. *S. cataphractum*
36. Basal flower bisexual, upper flowers male; upper leaves sessile; fruiting calyx lobes
 spatulate 115. *S. heteropodium*
 Flower solitary; upper leaves petiolate; fruiting calyx lobes not spatulate 37
37. Prickles usually (occasionally rare/absent) scattered on stems; leaves discolorous; corolla
 4-6 cm diam., lobes with distinct tips 2-7 mm long 123. *S. asymmetriphyllum*
 Prickles abundant on stems; leaves concolorous or slightly discolorous; corolla 2-3 cm diam.,
 lobes rounded or triangular 38
38. Leaves 5-18 cm long with scattered prickles; calyx lobes 5-6 mm long; corolla lavender, lobes
 triangular 119. *S. petraeum*
 Leaves 5-7.5 cm long, with numerous prickles; calyx lobes 2-5 mm long; corolla purple, lobes
 rounded 121. *S. carduiforme*
39. Pubescence on stems, calyx and young shoots rusty red or orange-brown 86. *S. gilesii*
 Pubescence on all parts grey-green, yellowish-green or purplish-green 40
40. Stems prostrate or sprawling 41
 Stems more or less erect 42
41. Leaves distinctly discolorous; fruiting peduncle 5-17 cm long, usually with 3-10 berries;
 fruiting calyx 1-1.5 cm diam. 76. *S. lucani*
 Leaves slightly discolorous; fruiting peduncle 2-6 cm long, usually with 1-4 fruits; fruiting
 calyx 2-2.5 cm diam. 77. *S. seitheae*
42. Anthers opening by longitudinal slits; fruiting calyx 7-10 mm diam., prickles rare or absent;
 seeds 4-5 mm long 80. *S. karsensis*
 Anthers opening by terminal pores; fruiting calyx 10-20 mm diam., prickles abundant; seeds
 1.5-3 mm long 43
43. Pubescence yellowish-green, stellate hairs frequently with glandular tips; fruiting calyx not
 woolly-pubescent 88. *S. gabriellae*
 Pubescence usually grey-green; growing points and calyx often purplish; stellate hairs never
 with glandular tips; fruiting calyx more or less woolly-pubescent 85. *S. lasiophyllum*

Synoptic key to plants with berry enclosed in calyx (GROUP VII)

- | | | |
|-------------------------------|-----------------------------|---------------------------------|
| 34. <i>S. rostratum</i> | 85. <i>S. lasiophyllum</i> | 117. <i>S. dioicum</i> |
| 35. <i>S. sisymbriifolium</i> | 86. <i>S. gilesii</i> | 118. <i>S. cunninghamii</i> |
| 49. <i>S. densevestitum</i> | 87. <i>S. ashbyae</i> | 119. <i>S. petraeum</i> |
| 50. <i>S. nemophilum</i> | 88. <i>S. gabriellae</i> | 120. <i>S. cataphractum</i> |
| 75. <i>S. echinatum</i> | 103. <i>S. campanulatum</i> | 121. <i>S. carduiforme</i> |
| 76. <i>S. lucani</i> | 108. <i>S. beaugleholei</i> | 122. <i>S. leopoldensis</i> |
| 77. <i>S. seitheae</i> | 109. <i>S. phlomoides</i> | 123. <i>S. asymmetriphyllum</i> |
| 80. <i>S. karsensis</i> | 110. <i>S. chippendalei</i> | 124. <i>S. tudununggae</i> |
| 82. <i>S. eardleyae</i> | 112. <i>S. clarkiae</i> | 125. <i>S. vansittartensis</i> |
| 83. <i>S. petrophilum</i> | 115. <i>S. heteropodium</i> | |
| 84. <i>S. lachnophyllum</i> | 116. <i>S. oedipus</i> | |
1. Annual, flowers yellow 34
 2. Large shrubs, small trees 87, 108, 123
 3. Generally prostrate plants 75, 76, 77, 122
 4. Prickles absent 49, 50
 5. Prickles sparse 80, 118, 123, 124
 6. Prickles abundant 34, 35, 75-77, 82-88, 103-122, 125
 7. Pubescence markedly glandular 35, 87, 88, 103
 8. Pubescence rusty 75, 86, 118, 119, 125
 9. Pubescence sparse above 76, 116, 122, 123
 10. Leaves more or less entire 49, 50, 75-77, 84, 85, 87, 88, 108-110, 112, 117-119, 123, 125
 11. Leaves shallowly lobed 77, 80, 86, 103, 110, 112, 115, 116, 122, 123
 12. Leaves deeply lobed 34, 35, 82, 83, 120, 121, 124
 13. Calyx lobes flattened \pm foliaceous 49, 50, 115

14. Berry substantially enclosed in calyx lobes 34, 35, 49, 50, 82, 83, 108, 109, 110, 112, 115, 116
15. Berry substantially enclosed in calyx tube 75, 76, 77, 80, 84-88, 103, 117-125
16. Berry succulent red 35, 49, 50
17. Berry greenish 75, 76, 77, 84-88, 115, 116, 121, 123-125
18. Berry yellowish 80, 82, 83, 103, 108, 109, 110, 112, 117, 118, 119
19. Berry finally hard boney 82, 83, 84, 122
20. Berry less than 10 mm diam. 34, 49, 50, 80, 83
21. Berry more than 10 mm diam. 34, 35, 75, 76, 77, 82-88, 103, 108-125
22. Seeds pale straw colour 35, 49, 50, 82-88
23. Seeds dark brown to black 34, 75, 76, 77, 80, 103, 108-125

GROUP VIII

Prickly plants with stellate hairs and exposed berries

1. Mature berry red, orange-red or blackish-red2
Mature berry greenish, yellowish or purplish, often drying brownish or blackish.....22
2. Inflorescence forked3
Inflorescence simple4
3. Large shrub or small tree; prickles 2-5 mm long, stout and conical; pubescence of lower leaf surface whitish 38. *S. giganteum*
Clonal shrub; prickles to 1.5 cm long, slender and straight; pubescence of lower leaf surface pale yellowish-green 42. *S. semiarmatum*
4. Leaves more or less linear, 2-14 mm wide5
Leaves lanceolate, elliptic or ovate, 1-14 cm wide7
5. Prickles abundant on stems, usually present on leaves; leaves often with 2 basal lobes, concolorous or slightly discolorous 45. *S. ferocissimum*
Prickles scattered to abundant on stems, usually rare or absent on leaves; leaves rarely with basal lobes, distinctly discolorous6
6. Corolla deeply stellate, 1-1.5 cm diam.; berry 5-8 mm diameter44. *S. parvifolium*
Corolla broadly stellate, 2.5-3 cm diam.; berry 10-15 mm diameter51. *S. elegans*
7. Stems densely to moderately densely prickly8
Stems with scattered prickles12
8. Stems often almost obscured by prickles; berry 8-12 mm diam.; corolla 1-2 cm diam. 42. *S. semiarmatum*
Stems never obscured by prickles; berry 10-20 mm diam.; corolla usually 2-3.5 cm diam.9
9. Pedicel and calyx with stellate, simple and glandular hairs 97. *S. inaequilaterum*
Pedicel and calyx with stellate hairs only10
10. Leaves ovate; stellate hairs sparsely scattered over both leaf surfaces, sometimes dense on lower surface 96. *S. sporadotrichum*
Leaves elliptic; leaf pubescence variable11
11. Stellate hairs dense on lower leaf surface, absent or confined to veins of upper surface; fruiting pedicels 1-1.5 cm long 46. *S. corifolium*
Stellate hairs sparse or confined to veins of both surfaces of mature leaves; juvenile leaves often with scattered hairs on lower surface; fruiting pedicels 2-3 cm long, distinctly thickened 95. *S. macoorai*
12. Leaves discolorous, usually with 2-4 basal lobes13
Leaves concolorous or discolorous, entire or with lobes along whole margin14
13. Corolla 3 cm diam., purple or heliotrope; berry 1-1.5 cm diam.51. *S. elegans*
Corolla 1-2 cm diam., pale lilac or white; berry 5-9 mm diam. 52. *S. chenopodium*
14. Leaves concolorous, usually sparsely pubescent to glabrous on both surfaces15
Leaves slightly to distinctly discolorous, at least lower surface densely pubescent18
15. Pedicel and calyx with stellate, simple and glandular hairs 97. *S. inaequilaterum*
Pedicel and calyx with stellate hairs only16
16. Berry 1-1.5 cm diam.; flowers deeply stellate, lower ones bisexual, upper ones male ... 48. *S. discolor*
Berry 1.5-2 cm diam.; flowers stellate, all bisexual17

17. Leaves elliptic; mature leaves with hairs sparsely scattered along veins or rarely scattered over lower surface; mature berry orange-red 95. *S. macoorai*
 Leaves ovate; mature leaves with hairs sparsely scattered over both surfaces, rarely denser on lower surface; mature berry scarlet red 96. *S. sporadotrichum*
18. Pubescence dense on upper leaf surface; leaves slightly discoloured; berry 5-8 mm diam. 50. *S. nemophilum*
 Pubescence sparse on upper leaf surface; leaves distinctly discoloured; berry 5-15 mm diam. 19
19. Inflorescence usually opposite leaf; lower flowers bisexual, upper ones male; seeds 4-5 mm long, hairy 47. *S. yirrkalensis*
 Inflorescence usually from internode; flowers all bisexual; seeds 1.5-3.5 mm long, glabrous 20
20. Mature berry 5-10 mm diam.; lower leaf surface pubescent or moderately woolly-pubescent with stellate, brownish hairs 43. *S. stelligerum*
 Mature berry 10-15 mm diam.; lower leaf surface pubescent with minute, stellate, whitish, pale yellowish or silvery hairs 21
21. Corolla deeply stellate, 2 cm diam.; leaves elliptic, length:width usually less than 3:1 46. *S. corifolium*
 Corolla broadly stellate, 2.5-3 cm diam.; leaves linear to lanceolate, length:width usually more than 3:1 51. *S. elegans*
22. Inflorescence forked 23
 Inflorescence simple 26
23. Corolla purplish; berry 1.5-3 cm diam.; clonal perennial herbs 24
 Corolla white; berry 1-1.5 cm diam.; large shrubs or small trees 25
24. Stems with few prickles; leaves lobed; flowers all bisexual; berry 1.5-2 cm diam. ... 53. *S. dimidiatum*
 Stems with abundant prickles; leaves entire; basal flower bisexual, others male; berry 3 cm diam. 108. *S. beaugleholei*
25. Mature leaves discoloured, to 7-lobed; stems green; flowers 2.5 cm diam.; pedicels with stellate and glandular hairs 37. *S. torvum*
 Mature leaves concolorous, 7-13-lobed; stems often rusty; flowers 3-4.5 cm diam.; pedicels with stellate hairs only 36. *S. hispidum*
26. Leaves usually 10-30 cm wide; corolla white; berry densely hairy 33. *S. ferox*
 Leaves usually 1-10 cm wide, if wider then corolla usually purplish; berry glabrous 27
27. Berries 3-10 cm diam. 28
 Berries usually 0.4-3 cm diam. 30
28. Berry usually more than 10 cm long and wide, purple when ripe; mature leaves ovate or ovate-oblong 106. *S. melongena*
 Berry 3-4 cm diam., yellowish when ripe; mature leaves elliptic or ovate-elliptic 29
29. Leaves (5) 8-12 cm wide, sparsely pubescent on upper surface except for distinctive whitish pubescence along margins 105. *S. marginatum*
 Leaves 2.5-4.5 cm wide, densely pubescent on upper surface, grey-green 109. *S. phlomoides*
30. Berry 1.5-3 cm diam., always solitary; inflorescence of one bisexual flower at base of cyme of male flowers; seeds black 31
 Berry 0.4-1.5 (3) cm diam., 1-several on each peduncle; flowers all bisexual, rarely lower ones bisexual, upper ones male; seeds pale coloured, rarely dark brownish or blackish 39
31. Leaves usually 2-7 cm long, deeply lobed; lobes linear, oblong or obovate; cut more than $\frac{1}{2}$ way to midvein 32
 Leaves 4-15 cm long, entire to shallowly lobed; lobes rounded or angular usually cut less than half way to midvein, or leaves with several basal lobes 35
32. Fruiting calyx lobes broadly triangular, appressed to fruit 113. *S. diversiflorum*
 Fruiting calyx lobes narrowly triangular, lanceolate or elliptic, not appressed to fruit. 33
33. Bisexual flower 4-4.5 cm diam.; fruiting calyx ovate-lanceolate or elliptic, strongly reflexed at maturity 111. *S. melanospermum*
 Bisexual flower 3-3.5 cm diam.; fruiting calyx narrow-triangular, broadly triangular with a linear tip, or lanceolate, never reflexed 34
34. Lobes on lower part of leaf often cut 2-3 mm from midvein; flowering calyx to 10 mm long; fruiting calyx lobes 1-1.5 cm long 114. *S. eburneum*
 Lobes on lower part of leaf rarely cut 2-3 mm from midvein; flowering calyx 10-30 mm long; fruiting calyx lobes 2-2.5 cm long 110. *S. chippendalei*
35. Mature fruiting calyx strongly reflexed 36
 Mature fruiting calyx loosely appressed to or raised from berry, never reflexed 37

36. Pubescence rusty-green; stems with scattered prickles; fruiting calyx lobes ovate-lanceolate or elliptic, 1-1.5 cm long 111. *S. melanospermum*
 Pubescence yellowish-green; stems with abundant prickles; fruiting calyx lobes more or less linear, 2.5-5 cm long 112. *S. clarkiae*
37. Fruiting calyx lobes triangular to broadly angular, 1-2 cm long; leaves entire 108. *S. beaugleholei*
 Fruiting calyx lobes narrow-triangular or broadly triangular with linear tip, 2-3 cm long; leaves entire or shallowly lobed 38
38. Mature leaves elliptic to ovate-elliptic, entire; bisexual flower 4-5 cm diam., male flowers 3-4 cm diam.; fruiting pedicel to 2 cm long; seeds 4-5 mm long 109. *S. phlomoides*
 Mature leaves ovate, entire to shallowly lobed; bisexual flower 3-3.5 cm diam.; male flowers 2-2.5 cm diam.; fruiting pedicel 2.5-5.5 cm long; seeds 3-3.5 mm long 110. *S. chippendalei*
39. Leaves orbicular, broadly ovate or ovate-elliptic, usually 0.4-3 cm long and broad 40
 Leaves not orbicular, broadly ovate or ovate-elliptic, and/or leaves more than 3 cm long 43
40. Leaves orbicular 41
 Leaves broadly ovate or ovate-elliptic 42
41. Leaves 4-15 mm diam., rusty; petiole 2-4 mm long, often with a pair of spines at base 56. *S. nummularium*
 Leaves 15-30 (35) mm diam., silvery or rusty; petiole 5-10 mm long, usually without paired spines at base 55. *S. orbiculatum*
42. Leaves ovate-elliptic, entire, 7-15 mm long; corolla deeply stellate; berry 1-1.5 cm diam. 65. *S. elachophyllum*
 Leaves broadly ovate, 8-30 mm long, entire or shallowly lobed at base; corolla rotate; berry 4-10 mm diam. 79. *S. oligacanthum*
43. Scrambling or sprawling shrubs, rarely erect to 5 m; prickles on stems usually distinctly recurved, prickles on leaves curved, straight or absent 44
 Shrubs to 3 m, often clonal but not scrambling; prickles on stems and leaves more or less straight, rarely slightly curved 46
44. Inflorescence a corymb, more than 12-flowered; fruiting pedicels 1-2 cm long; mature berry 1-1.5 cm diam. 37. *S. torvum*
 Inflorescence a cyme, less than 12-flowered; fruiting pedicels 2-4 cm long; mature berry 1.5-3.5 cm diam. 45
45. Rampant scrambling shrub; upper leaf surface sparsely pubescent; stellate hairs on lower leaf surface yellowish, in one layer, each with a long central ray 102. *S. hamulosum*
 Erect or sprawling shrub; upper leaf surface glabrous or with scattered hairs; stellate hairs on lower leaf surface, whitish, in several layers, each with a short central ray or central ray absent 101. *S. dimorphispinum*
46. Corolla campanulate 47
 Corolla rotate or stellate 50
47. Corolla deeply campanulate; berry globular to obovoid; hairs moderately dense, sparse or absent on both leaf surfaces 48
 Corolla campanulate-rotate; berries globular; hairs sparse on upper leaf surface, dense to moderately dense on lower surface 49
48. Hairs moderately dense on both leaf surfaces; mature berry 2-2.5 cm diam. 103. *S. campanulatum*
 Hairs sparse or absent on both leaf surfaces; mature berry 1.5 cm diam. 89. *S. prinophyllum*
49. Mature berry 2.5-3 cm diam., yellowish; inflorescence a cluster of 1-3 flowers 92. *S. pungetium*
 Mature berry 1.5-2 cm diam., dark brown; inflorescence a 3-7-flowered cyme 104. *S. cinereum*
50. Mature leaves distinctly lobed, lobes usually cut $\frac{1}{4}$ or more of way to midvein, OR leaves plicately folded 51
 Leaves entire to shallowly lobed, lobes cut less than $\frac{1}{4}$ way to midvein 64
51. Leaves 5-10 mm wide, margin plicately folded 58. *S. plicatile*
 Leaves usually more than 10 mm wide, margin lobed 52
52. Lower leaf surface sparsely pubescent to almost glabrous; mature berry greenish, purplish, brownish or blackish 53
 Lower leaf surface densely to moderately densely pubescent; mature berry yellowish, brownish or blackish 54
53. Anthers 2-2.5 mm long; mature berry 1.5 cm diam., greenish or purplish 89. *S. prinophyllum*
 Anthers 5-6 mm long; mature berry 2-3 cm diam., brownish or blackish 107. *S. hermanni*

54. Hairs sparse on upper leaf surface55
 Hairs dense to moderately dense on upper leaf surface59
55. Mature berry 2-3 cm diam.; leaves concolorous or slightly discolorous56
 Mature berry 1-2.5 cm diam.; leaves usually distinctly discolorous57
56. Mature berry yellowish; inflorescence a 1-3-flowered cluster; corolla campanulate-rotate92. *S. pungetium*
 Mature berry brownish or blackish; inflorescence a 1-6-flowered raceme; corolla rotate-stellate107. *S. hermanni*
57. Prickles bright reddish or bright orange-red; flowering calyx lobes 1-1.5 mm long; mature berry 1-1.5 cm diam.69. *S. lacunarium*
 Prickles pale yellowish or pale orange; flowering calyx lobes 2.5-5 mm long; mature berry 1.5-2.5 cm diam.58
58. Lower leaf surface, peduncle and pedicels densely woolly-pubescent; flowering calyx lobes triangular; corolla broadly stellate to rotate100. *S. brownii*
 Lower leaf surface, peduncle and pedicels not woolly-pubescent; flowering calyx lobes usually linear; corolla campanulate-rotate104. *S. cinereum*
59. Mature fruit pale brownish, hard and bony; fruiting calyx lobes firmly appressed to fruit83. *S. petrophilum*
 Mature fruit pale yellowish, mucilaginous; fruiting calyx lobes not firmly appressed to fruit60
60. Plants pubescent with stellate and glandular hairs61
 Plants pubescent with stellate hairs only63
61. Leaves shallowly lobed, lobes angular or rounded62
 Leaves entire to slightly undulate72
62. Leaves green, glandular hairs abundant; inflorescence to 2 cm long67. *S. adenophorum*
 Leaves rusty-green, glandular hairs not abundant; inflorescence 2-6 cm long68. *S. eremophilum*
63. Leaves green, lobes broadly triangular to oblong; axis of inflorescence 2-5 cm long; berry 15-20 mm diam.53. *S. dimidiatum*
 Leaves rusty-green or rarely green, lobes rounded; axis of inflorescence 0.5 cm long; berry 5-10 mm diam.57. *S. oldfieldii*
64. Lower leaf surface sparsely pubescent, upper surface pubescent only along veins; stems sprawling; flower peduncle usually 2-4 cm long90. *S. multiglochidiatum*
 Lower leaf surface densely to moderately densely pubescent, upper surface variable; stems erect or sprawling; flowering peduncle usually less than 2 cm long (rarely to 4 cm)65
65. Upper leaf surface sparsely pubescent, leaves often distinctly discolorous; stems erect66
 Upper leaf surface densely pubescent, leaves concolorous to slightly discolorous; stems erect or sprawling68
66. Corolla deeply stellate; lower flowers bisexual, upper ones male; berry broadly ovoid .98. *S. dallachii*
 Corolla broadly stellate to rotate; all flowers bisexual; berry globular or depressed-globular67
67. Lower leaf surface peduncle and pedicels densely woolly-pubescent, hairs pale yellowish or pale greenish; leaf lobes triangular or oblong; seeds 2.5-3.5 mm long100. *S. brownii*
 Lower leaf surface moderately densely woolly or not woolly-pubescent, hairs bright yellow or rusty; leaf lobes broadly triangular or rounded; seeds 1.5-2 mm long99. *S. furfuraceum*
68. Mature fruit pale brownish, hard and bony; fruiting calyx lobes firmly appressed to fruit83. *S. petrophilum*
 Mature fruit yellowish, orange-brown or purplish, not hard and bony; fruiting calyx lobes not firmly appressed to fruit69
69. Stems sprawling; flowers not opening, or corolla 1-1.5 cm diam.; mature berry pale yellow-green or slightly purplish73. *S. cleistogamum*
 Stems erect; flowers always opening, corolla 1.5-4 cm diam., mature berry orange-brown, yellowish-brown or yellow70
70. Corolla rotate-pentagonal, 2.5-4 cm diam.; young shoots and inflorescence usually rusty-green57. *S. oldfieldii*
 Corolla rotate-stellate, 1.5-3 cm diam.; young shoots usually grey-green or silvery-green72
71. Prickles usually reddish; leaves usually silver-green; flowering peduncle to 1 cm long; anthers 5-8 mm long54. *S. elaeagnifolium*
 Prickles never reddish; leaves usually grey-green; flowering peduncle 1-4 cm long; anthers 4-5 mm long62. *S. esuriale*

72. Upper leaf surface sparsely pubescent or almost glabrous73
 Upper leaf surface densely pubescent77
73. Lower leaf surface sparsely pubescent; leaves ovate, green or yellowish-green; seeds 3-3.5 mm long 90. *S. multiglochidiatum*
 Lower leaf surface densely to moderately densely pubescent; leaves various; seeds various74
74. Leaves oblong, ovate-oblong or lanceolate, length:width more than 2.5:175
 Leaves broadly lanceolate or ovate to elliptic, length:width less than 2.5:176
75. Leaves lanceolate, 1-4 cm wide; lower leaf surface, peduncle and pedicels densely woolly-pubescent; berry 15-20 mm diam. 100. *S. brownii*
 Leaves oblong or ovate-oblong, 0.5-2.5 cm wide; lower leaf surface, peduncle and pedicels not woolly-pubescent; berry 10-15 mm diam.64. *S. tetrathecum*
76. Pubescence on lower leaf surface bright yellow or rusty; inflorescence 1 cm long, opposite leaves; corolla broadly stellate; fruiting calyx lobes usually 10-14 mm long... 99. *S. furfuraceum*
 Pubescence on lower leaf surface greenish; or pale yellowish inflorescence 2-5 cm long, from internode; corolla deeply stellate; fruiting calyx lobes about 5 mm long.....98. *S. dallachii*
77. Mature fruit dry, brownish or blackish78
 Mature fruit bony or mucilaginous, yellowish, greenish, purplish or orange-brown79
78. Plants pale or rusty yellowish-green; leaves concolorous; dry fruit brown, raisin-like; seeds pale brownish 60. *S. centrale*
 Plants silvery-green or grey-green; leaves discolorous; dry fruit brownish-black, skin brittle; seeds blackish 78. *S. sturtianum*
79. Mature fruit hard and bony, lower half enclosed by enlarged calyx lobes81. *S. quadriloculatum*
 Mature fruit not hard and bony, lower half not enclosed by enlarged calyx80
80. Mature berry yellowish-green, greenish or flushed with purple; stems sprawling or prostrate81
 Mature berry yellow, yellowish-brown or orange-brown; stems usually erect, rarely sprawling85
81. Fruiting pedicels to 1.5 cm long82
 Fruiting pedicels 1.5-3 cm long83
82. Stems with scattered prickles; corolla deeply stellate, white or pale lavender; seeds light brown 72. *S. dianthophorum*
 Stems densely prickly; corolla rotate, purple; seeds dark greyish-brown 74. *S. horridum*
83. Stems to 10 cm long; corolla stellate; mature berry 8-10 mm diam. 70. *S. terraneum*
 Stems usually longer than 10 cm; corolla rotate to rotate-pentagonal; mature berry 10-20 mm diam.84
84. Corolla always opening, 2-3 cm diam., purple; berry 15-20 mm diam. 71. *S. ellipticum*
 Corolla not opening, or opening and 1-1.5 cm diam., pale lavender; berry 10-13 mm diam. 73. *S. cleistogamum*
85. Prickles usually scattered on leaves and petioles86
 Prickles absent from leaves and petioles87
86. Leaves silvery-green or rusty-green; flowering calyx 9-10 mm long, lobes awl-shaped; fruiting pedicels 2-3 cm long 54. *S. elaeagnifolium*
 Leaves grey-green; flowering calyx 2-3 mm long, lobes bluntly triangular; fruiting pedicels to 1.5 cm long63. *S. tumulicola*
87. Leaves ovate, more than 2 cm wide88
 Leaves lanceolate to oblong, less than 2 cm wide89
88. Leaves grey-green; berry 10-15 mm diam.; seeds 2-3 mm long 55. *S. orbiculatum*
 Leaves green or rusty-green; berry 5-10 mm diam.; seeds 1-2 mm long 57. *S. oldfieldii*
89. Leaves silvery-green, rarely greyish-green; prickles straight or curved; flowers 4- to 5-partite59. *S. coactiliferum*
 Leaves rusty-green, grey-green or green; prickles straight; flowers 5-partite90
90. Leaves rusty-green, rarely green; seeds 1-2 mm long91
 Leaves greyish- or dark-green; seeds 2-3 mm long92
91. Prickles to 8 mm long; flowering calyx 6-10 mm long, lobes oblong to obovate; corolla rotate-pentagonal, 2.5-4 cm diam. 57. *S. oldfieldii*
 Prickles to 3 mm long; flowering calyx 4-6 mm long, lobes bluntly triangular; corolla broadly stellate, 2-2.5 cm diam. 61. *S. hesperium*
92. Subshrub to 60 cm; flowering peduncle to 1 cm long; berry never with an acute tip; seeds light grey 64. *S. tetrathecum*
 Herbaceous perennial to 30 cm; flowering peduncle 1-4 cm long; berry often with an acute tip; seeds yellowish93

93. Leaves oblong; flowering peduncle 1-4 cm long; flower pedicel 1-1.5 cm long; flowering calyx lobes linear to narrow-triangular, 2-3 mm long 62. *S. esuriale*
 Leaves linear-oblong; flowering peduncle 1-1.5 cm long; flower pedicel to 1 cm long; flowering calyx lobes triangular, 1-1.5 mm long 63. *S. tumulicola*

Synoptic key to prickly plants with stellate hairs and exposed berries (GROUP VIII)

- | | | |
|------------------------------|---------------------------------|-------------------------------|
| 33. <i>S. ferox</i> | 60. <i>S. centrale</i> | 95. <i>S. macoorai</i> |
| 36. <i>S. hispidum</i> | 61. <i>S. hesperium</i> | 96. <i>S. sporadotrichum</i> |
| 37. <i>S. torvum</i> | 62. <i>S. esuriale</i> | 97. <i>S. inaequilaterum</i> |
| 38. <i>S. giganteum</i> | 63. <i>S. tumulicola</i> | 98. <i>S. dallachii</i> |
| 42. <i>S. semiarmatum</i> | 64. <i>S. tetrathecum</i> | 99. <i>S. furfuraceum</i> |
| 43. <i>S. stelligerum</i> | 65. <i>S. elachophyllum</i> | 100. <i>S. brownii</i> |
| 44. <i>S. parvifolium</i> | 67. <i>S. adenophorum</i> | 101. <i>S. dimorphispinum</i> |
| 45. <i>S. ferocissimum</i> | 68. <i>S. eremophilum</i> | 102. <i>S. hamulosum</i> |
| 46. <i>S. corifolium</i> | 69. <i>S. lacunarium</i> | 103. <i>S. campanulatum</i> |
| 47. <i>S. yirrkalensis</i> | 70. <i>S. terraneum</i> | 104. <i>S. cinereum</i> |
| 48. <i>S. discolor</i> | 71. <i>S. ellipticum</i> | 105. <i>S. marginatum</i> |
| 50. <i>S. nemophilum</i> | 72. <i>S. dianthophorum</i> | 106. <i>S. melongena</i> |
| 51. <i>S. elegans</i> | 73. <i>S. cleistogamum</i> | 107. <i>S. hermanni</i> |
| 52. <i>S. chenopodium</i> | 74. <i>S. horridum</i> | 108. <i>S. beaugleholei</i> |
| 53. <i>S. dimidiatum</i> | 78. <i>S. sturtianum</i> | 109. <i>S. phlomoides</i> |
| 54. <i>S. elaeagnifolium</i> | 79. <i>S. oligacanthum</i> | 110. <i>S. chippendalei</i> |
| 55. <i>S. orbiculatum</i> | 81. <i>S. quadriloculatum</i> | 111. <i>S. melanospermum</i> |
| 56. <i>S. nummularium</i> | 83. <i>S. petrophilum</i> | 112. <i>S. clarkiae</i> |
| 57. <i>S. oldfieldii</i> | 89. <i>S. prinophyllum</i> | 113. <i>S. diversiflorum</i> |
| 58. <i>S. plicatile</i> | 90. <i>S. multiglochidiatum</i> | 114. <i>S. eburneum</i> |
| 59. <i>S. coactiliferum</i> | 92. <i>S. pungetium</i> | |

1. Large shrubs, small trees 36, 37, 38, 95-102
2. Woody shrubs 33, 42-48, 50-52, 55-59, 61, 65, 78, 81, 83, 95-113
3. Herbaceous perennials 53, 54, 60, 62, 63, 64, 67-74, 79, 89, 90, 92, 114
4. Plants \pm prostrate 46, 60, 62, 63, 67-74, 89, 90, 92, 113, 114
5. Prickles sparse 47, 50, 52, 55, 56, 58, 59, 60-64, 70, 78, 79, 95, 98, 106
6. Prickles hooked 59, 69, 101, 102
7. Leaves sparsely pubescent above 38, 42-48, 52, 64, 65, 89, 90, 92, 95, 96, 97, 101, 102, 104, 107
8. Leaves > 10 cm long 33, 36, 37, 38, 95-99, 101-106
9. Leaves entire 38, 43-47, 50, 51, 54-56, 59, 60-65, 70-74, 78, 81, 100, 106, 108-110
10. Leaves shallow or angular lobed 33, 37, 42, 46, 47, 48, 51-54, 57, 58, 67-69, 79, 83, 89, 90, 92, 95-107, 111, 113, 114
11. Leaves deeply lobed 36, 37, 42, 53, 58, 67, 68, 69, 83, 104, 107, 111, 113, 114
12. Leaves with basal lobes 45, 52
13. Leaves orbicular/reniform 55, 56, 65, 79
14. Flowers deeply stellate 38, 55, 56, 65
15. Flowers broadly stellate 33, 36, 37, 42-50, 52-54, 58-64, 68-70, 81, 95-99, 101, 102
16. Flowers rotate 51, 57, 67, 68, 71-79, 83-92, 102-114
17. Flowers campanulate 103
18. Lower flower bisexual upper flowers male 33, 36, 37, 103-114
19. Flower white 33, 36, 37, 105
20. Flowers nearly white to pale blue 43, 44, 45, 46, 47, 52, 105
21. Berry succulent, orange to red 38, 42-52, 95-99, 101, 102
22. Berry green flushed purple 67, 68, 70, 71, 72, 73, 74, 89, 90, 92, 106
23. Berry yellowish 33, 36, 37, 53-65, 69, 78, 79, 81, 83, 103-114
24. Berry finally pale, bony 81, 82, 83
25. Berry generally < 1 cm diam. 38, 42-52, 58, 70, 79
26. Berry about 1 cm diam. 36, 37, 54, 56, 57, 58, 59, 60, 61, 69, 70, 73
27. Berry about > 1 cm diam. 33, 53, 55, 56, 59, 60, 62-65, 67-69, 71, 72, 74, 78, 81-114
28. Seeds pale buff straw colour 33, 36, 37, 38, 42-48, 50-65, 67-74, 81, 83, 89, 90, 92, 95-102, 104, 105-107
29. Seeds dark brown to black 78, 79, 103, 108-114

Section 1. *Solanum*

This section includes annuals, herbaceous perennials or soft-wooded short-lived shrubs. They are unarmed, and pubescent with simple or glandular hairs. The leaves are simple with entire or lobed margins. The inflorescence consists of condensed or sub-umbellate cymes of generally small, stellate flowers, white or tinged lavender or purple in colour. The filaments and style are usually pubescent and the anthers oblong opening by pores which may develop into short slits. The berry is succulent, green, yellow, reddish or purple-black in colour; stone cell masses may be present. Diploid, tetraploid and hexaploid species occur and the base chromosome number is $n = 12$.

The section is undoubtedly cosmopolitan in its distribution (except boreal, alpine or aquatic habitats); however, it has been further spread by man and weedy aliens now occur on all continents. The principal centre of speciation is South America. Many species have been described and the problems of nomenclature and synonymy are considerable. The species *S. triflorum* Nutt. is sometimes associated with this section but it is doubtful if it really belongs here.

There has been no dispute in the attribution of the first ten species of this revision to this section.

1. *Solanum americanum* Mill., Gard. Dict. ed. 8, (1768) Art. *Solanum* No. 5.

Type citation: Cultivated Chelsea Physic Garden, and said to have been introduced from Virginia, North America.

Lectotype: Miller s.n. (BM, photo ADW), Edmonds (1971).

Solanum nodiflorum Jacq., Coll. Bot. 2 (1789) 288, Icon. Pl. Rar. 2 (1789) t. 326.

Type citation: Described and illustrated from plants cultivated at Vienna and stated to have been introduced from Mauritius.

Type material: Lectotype BM, photo ADW and Henderson (1974: Pl. 1).

For discussion of typification and synonyms see Edmonds (1971) 634, (1972) 103; D'Arcy (1974) 834; Henderson (1974) 29 as *S. nodiflorum*, (1977) 20 as *S. americanum*. *S. nigrum* L. var. *pteroaulon* Domin (1928) 1127 and *S. pterocaulon* Dun.: Cheel (1917) 595 were misapplied to this species. Close comparison of the type specimen of *S. nodiflorum* at BM and of the drawing by Jacq. (1789, t. 326) shows that the lectotype specimen of *S. nodiflorum* Jacq. is probably the specimen on which the illustration is based.

Literature

The section *Solanum* (*Maurella*) has an extensive literature centred principally on *S. nigrum* L., but as the misapplication of names has been extensive all earlier usage should be viewed critically. The principal and more recent taxonomic references to *S. americanum*/*S. nodiflorum* are given first (1) followed by earlier and/or more general references (2).

- 1). Cheel (1917) 583; Stebbins & Paddock (1949) 77; Baylis (1958) 379; Edmonds (1971) 634, (1972) 103; D'Arcy (1973) 735, (1974) 834; Henderson (1974) 28; Morton (1976) 150, 155.
- 2). Dunal (1813) 151; Dunal in Poiret (1814) 741; Dunal (1816) 12; Don (1837) 411; Walpers (1844) 47; Dunal (1852) 46, 678; Larsen (1943) 1; Westergaard (1948) 1; Mason (1957) 701; Allan (1961) 835; McBride (1962) 172; Smith & Downs (1966) 55; Willis (1972) 550; Beadle, Evans & Carolin (1972) 488; Everist (1974) 473; Gentry (1974) 104; Heine (1976) 148 comments under *S. nigrum* L. s.l.; Morton (1976) 150, 155.

Common name: glossy nightshade.

A short lived *perennial* or *herb* to 1.25 m tall, erect or widespreading, finally straggly with age, unarmed, general aspect bright or dark green or stems and leaves flushed with purple, glabrous or sparsely pubescent with curved, simple hairs; stems may be angled or narrowly winged with lines of tissue carried down from the base of the petioles; the wings may be smooth or with short soft teeth. *Leaves* varying greatly in size (vigorous young plants may have leaves 10-12 x 7 cm on petioles 6-9 cm long, later leaves more commonly c. 6 x 3 cm, second year growth may be quite small and only 2 x 1 cm), ovate or ovate-lanceolate, entire or with up to 8 short, blunt, rounded lobes on each margin, sinus shallow and rounded, leaf apex acute to acuminate, base truncate to cuneate and

continued as a narrow wing along the petiole; petiole 1-4 (-9) cm. *Inflorescence* an umbellate cyme of 4-8 flowers from an extra-axillary position; peduncle 0.8-2.5 cm, slender, erect or ascending, internodes of the peduncle very condensed; pedicels 5-8 mm. *Calyx* 1-2 mm, campanulate at anthesis; the lobes about 1 mm, rounded or bluntly obtuse. *Corolla* 8-9 mm diam., deeply stellate, with yellow-green star; the lobes about 1.5 mm wide, white or flushed purple. *Filaments* (Fig. 159) c. 1-2 mm, with spreading hairs on the inner side; anthers 1.5-2 mm long, oblong, opening by terminal pores extending to lateral slits. *Ovary* 1 mm diam., globular, glabrous; style 2.5-4 mm long, erect, spreading hairy in



Fig. 1. *Solanum americanum* Mill. Drawn from field grown plant at the Waite Institute, from seed from Henderson 298, collected in Salisbury, Brisbane, Qld (ADW 40796). $\times \frac{2}{3}$.

the lower half; stigma capitate at about the level of the anther tips, pale green. Fruiting peduncle enlarged up to 4 cm long; pedicels erect or decurved in fruit; calyx somewhat enlarged and the lobes reflexed; *berry* (Fig. 148) globular, 6-9 mm diam., purplish-black, glossy, readily shed when ripe; sclerotic granules 0-4 (-8), c. 0.5 mm diam. *Seeds* 1-1.5 mm long, mature cleaned seed a light bone colour but often stained and tinged purple, (40-) 50 (-100) per fruit. (Fig. 1.)

Chromosome number: $n = 12$ Henderson (1974); Symon & Randell (1976).

Distribution and habitat (Map 18)

All Australian States except South Australia, probably native to eastern Australia or at least introduced before white settlement, possibly late introduction to W.A., N.T., Vic. and Tas.

Cosmopolitan in tropic and warm temperate regions, at higher altitudes when close to the equator.

It is to be found in a wide range of environments generally associated with some degree of man-made disturbance, waste places, orchards and gardens, light grazings and footpath margins.

Notes

For extensive discussion of this species see Edmonds (1971 and 1972) and Henderson (1974) in which the problems of both nomenclature and species delimitation will be evident.

Cosmopolitan weedy species are often extremely variable and I have accepted a broad concept for this taxon. There is no doubt that variants can be recognised and taxa with erect or decurved pedicels, white or purple flowers, presence or absence of sclerotic granules, more or less leaf lobing or pubescence do occur.

Until the taxon has been studied on a world-wide basis, regional or partial accounts may not adequately reflect the total morphological variation or result in satisfactory taxonomy. Edmonds (1972:103) divided the American populations into two varieties based on their degree of pubescence and on different (but overlapping) geographical distribution in the Americas. The latter attribute cannot be applied elsewhere in the world where taxa with varying degrees of pubescence may not be separated geographically. Henderson (1974:28) has not clearly distinguished the taxa *S. nodiflorum* and *S. americanum* though he tables some of the differences of the two lectotypes. He then subdivides his taxon (*S. nodiflorum*) at the rank of subspecies, on the basis of pedicel aspect and the presence or absence of sclerotic granules. However as he states, Henderson (1974:29) "Hybrids occur naturally where these subspecies are sympatric. Consequently the combination of diagnostic subspecies characters is often lost in F_1 plants and F_2 or later filial selfed or backcrossed progeny". From his description and comments, D'Arcy (1974:834) accepts wide morphological variation in his concept of the taxon *S. americanum*, noting particularly that the distinction between glabrate and pubescent varieties is not meaningful in Florida. He does not mention sclerotic granules. Edmonds (1972:99), in her key to the South American species, does not give extended descriptions but does use the presence or absence of sclerotic granules in her key and in her lead 7 includes "stone cells usually absent", which leads through 8 and 9 to *S. americanum*, which by implication at least includes some plants with sclerotic granules. The extensive biological, statistical and taxonomic studies known to have been done by Dr Edmonds will hopefully resolve some of these problems. In Indian literature the name *S. nigrum* L. is widely and stubbornly misapplied to *S. americanum* and to date no comprehensive account of the species in S.E. Asia has been published. It may be noted that European, American and Australian authors consider *S. americanum/nodiflorum* to be diploid with

perhaps occasional aberrations and *S. nigrum* to be hexaploid and on this at least there is overwhelming agreement. For these reasons I have used what is believed to be the earliest name applicable to the populations and have not used any lower categories. If followed, it results in an unfortunate name change following closely on Henderson's comprehensive account of this section in Australia.

When grown in Adelaide, *S. americanum* behaved as a perennial and almost all plants grown in the field in summer survived the winter and continued growing as straggly, small leaved shrubs the next summer. When grown in pots or in the field the plants tended to be tall, not freely branched low down and were Y-shaped at least to begin with.

Selected specimens (total seen about 120)

Henderson (1974) 29 sub. *S. nodiflorum* cites many specimens not repeated here.

WESTERN AUSTRALIA: *Wilson* 6069, 26.viii.1967, Belmont (ADW, PERTH); *Royce* 8408, 6.i.1968, South Perth (ADW, PERTH); *Beaglehole* 12438, 6.ix.1965, N of Busselton (acb, ADW).

NORTHERN TERRITORY: *Holmes s.n.*, 28.ix.1972, Adelaide River farms (ADW, NT); *Holmes s.n.*, 22.xi.1972, Jettners Farm, Adelaide River (ADW, DNA, NT).

QUEENSLAND: *Everist* 5606, 11.ix.1956, Belmont, near Brisbane (BRI, CANB); *Henderson* 288, 8.viii.1967, Benarkin State Forest, Blackbutt (ADW, BRI); *Symon* 4879, 25.v.1967, Ravenshoe (ADW, BRI, CANB); *Symon* 4779, 20.v.1967, just N of Laura (ADW, BRI, CANB, K, L).

NEW SOUTH WALES: *Rodd* 690, 5.viii.1968, Seal Rocks (ADW, NSW); *Evans s.n.*, 6.xi.1952, 12 km WNW of Sydney (ADW, NSW); *Constable* 5633, 14.i.1968, The Lake, Scarborough Park, Kagarah (ADW, NSW).

VICTORIA: *Willis s.n.*, 7.xi.1973, Wolumla Road, near Candelo (ADW, MEL); *Beaglehole* 21847, 15.ix.1966, McDonald Park, Ararat (acb, ADW, MEL).

2. *Solanum opacum* A. Braun and Bouché, Ind. Sem. Hort. Berol. App. 8 (1853) 18, No. 39.

Type citation: Cultivated at the Berlin Botanical Gardens from New Holland, the seed communicated by Listemann.

Holotype: Not seen, probably destroyed. *Neotype*: Broad Sound, Sept. 1802, *R. Brown s.n.* (NSW 125341), Henderson (1974).

Nomenclature and synonymy: for details see Henderson (1974). *S. nigrum* L. var. *humile* F.M. Bail. (1881) 1-4; *S. nigrum* L. var. *pteroaulon* Domin (1928) 1127; *S. nigrum* L. var. *chlorocarpum* F. Muell. nom. nud.: Domin (1928) 1127 were all misapplied to this species.

Common name: green berry nightshade.

A sprawling almost prostrate annual *herb* to 1 m across, pubescent with appressed simple hairs, and with minute almost sessile glandular hairs below these, internodes relatively long giving the plant a 'stemmy' open appearance. *Leaves* on vigorous growth ovate-lanceolate, to 6 x 5 cm, but commonly 3-5 x 1-2 cm, decurrent down the petiole 1-4 cm, lobes almost always present, from 2-10 per leaf, only in extreme cases are the short lobes cut more deeply than about 1/3 of the width of the leaf. *Inflorescence* a very short raceme or subumbel of 2-5 white flowers; peduncle relatively long and slender, 1.5-2 cm long; rhachis of the inflorescence 2-3 mm long; pedicels 7-10 mm long. *Calyx* 2-3 mm long. *Corolla* c. 1 cm diam., stellate. *Filaments* (Fig. 159) 1.5 mm long, pilose below; anthers 2 mm long, oblong, pale yellow. *Style* pilose below; stigma projecting just above the anther pores. *Mature fruit* (Fig. 148) c. 1 cm diam., commonly 3 per truss, green, close to R.H.S. Willow green 000862/1, readily deciduous with its pedicel, aromatic and with (25-) 45 (-60) seeds per fruit; sclerotic stone cells 1-4, 0.75 mm diam. *Seeds* c. 2 mm long, mature cleaned seed pale bone colour with faint green tinges. (Fig. 2.)

Chromosome number: n = 36 Henderson (1974); Randell & Symon (1976).

Notes

For extensive discussion on this species see Henderson (1974).

In cultivation at Adelaide, *S. opacum* behaved as an annual and plants grown in the

field during summer were dead by early June.

Distribution and habitat (Map 20a)

Eastern Australia from northern Qld to eastern Vic. and Tas.; occasional on the upper River Murray in S.A. It is doubtful if the specimen recorded from Kangaroo Island represents any established population. The species also occurs in the highlands of Papua New Guinea. Found in mesic sites along creeklines, in rainforest clearings, less commonly under open *Eucalyptus* woodland, on red earths and shales.



Fig. 2. *Solanum opacum* A. Braun & Bouché. Drawn from field grown plant at the Waite Institute, from seed from K. Ingram, collected in the Bouddi Range, NSW (ADW 40795). $\times \frac{2}{3}$.

Selected specimens (total seen about 110)

QUEENSLAND: Ex *Henderson* 285, Aug. 1967, Balfour Range, Blackbutt (BRI) & cult. (ADW, CANB); *Kleinschmidt s.n.*, 24.i.1965, Kenmore, Brisbane (ADW, BRI); *Brown s.n.*, Sept. 1802, Broad Sound (BM, K, MEL, NSW); *Johnson* 462, 3.v.1958, Bell-Bunya Mts Road (BRI); *Dietrich* 827, Feb. 1866, Rockhampton (MEL).

NEW SOUTH WALES: *Constable s.n.*, 28.iv.1956, Girard State Forest (ADW, NSW); *Symon* 7628, 24.ii.1972, Canberra (ADW & cult. CANB, L, NSW); *Henderson* 1261, 22.ii.1972, Toonumbar State Forest (ADW, BRI); *Boorman s.n.*, March.1917, Chandlers Peak, Guyra (NSW).

VICTORIA: *Beaglehole* 35137, 3.xii.1970, junction of Snowy River and Snowy Creek, East Gippsland (acb, ADW, MEL); *Beaglehole* 33110, May 1970, 6 km W of Tubbut (acb, ADW).

TASMANIA: *Gunn* 51/1842, 5.vii.1843, Point Effingham near Bell Bay (HO); *Hamilton* 163, 6.xi.1932, Harford on Solomons Hill, 250' alt., rocky hilltop, herb with blue flowers, height 30 cm (HO).

SOUTH AUSTRALIA: *Symon* 11578, 13.ix.1979, concealed dune, W of Queens Bend, River Murray, occasionally under *Euc. largiflorens* woodland (ADW); *Symon* 11586, 14.ix.1979, River Murray at 375 mile post (4 mile downstream from Little Huncree Island) common in shallow depressions with *S. nigrum* (ADW).

*3. *Solanum douglasii* Dunal in DC., Prod. 13 (1852) 48.

Type citation: "In Nova California (Douglas 1833, herb. soc. hort. Lond. in h. DC.)"

Type material: Holotype G-DC, not seen, photo ADW. This specimen bears the label "DC. Herb. Soc. Hort. Lond. Nova California, Douglas leg. 1839".

Literature

Stebbins & Paddock (1949) 76; Edmonds (1972) 108; Willis (1972) 551; Henderson (1974) 63.

A short lived, soft wooded *shrub* to about 1 m tall, stems slightly angled, unarmed. Tomentum of curved, simple hairs, appressed or erect, abundant on new growth, sparse later. *Leaves* variable depending on age and vigour, to 15 x 7 cm in cultivation, more commonly about 5-7 x 2.5-3.5 cm, but to 2-3 x 1.5-2 cm on second year stems, ovate to narrow-ovate or narrow elliptic, the margin irregularly lobed, the antrorsely directed lobes bluntly triangular, mostly broad with shallow sinuses, apex acute, to sub-acuminate, base attenuate to subcuneate; petiole 2-3 (-7) cm, winged above. *Inflorescence* a condensed cyme of about 5-10 flowers; peduncle 2-2.5 cm, erect or ascending, extra-axillary; pedicels 1-1.5 cm erect or decurved after anthesis. *Calyx* tube about 1.5 mm long; calyx lobes 1 mm blong, bluntly triangular. *Corolla* 1 cm long, the tube about 5 mm; the lobes 5-6 mm, broadly stellate, tinged violet or purple. *Filaments* (Fig. 159) 1-2 mm, sparsely pubescent; anthers 3-4 mm, oblong. *Ovary* c. 1 mm diam.; style to 8.5 mm, extending to 3.5 mm beyond the anther tips, pubescent below; stigma capitate. *Berry* (Fig. 148) 6-8 mm diam., globose, dull black; sclerotic granules reported 0-8 but not available in local material. *Seeds* 1.5 mm long, pale buff colour.

Illustrations: Abrams, Ill. Fl. Pacific State 3 (1951) fig. 4496.

Chromosome number: n = 12 Stebbins & Paddock (1949) 76; Henderson (1974) 12.

Notes

When Henderson's (1974) paper was published he did not consider *S. douglasii* to be established in Australia, although several collections had been grown both at ADW and BRI for the general comparison of species in this section. Since then the collection cited below has been made. Critical determination of the name of this taxon will depend upon the work of Dr J. Edmonds on the American species of the section. Edmonds (1972:108) considered *S. douglasii* to be a synonym of *S. nigrescens* Mart. & Gal. However, in more recent papers by Edmonds (1977), Edmonds & Glidewell (1977) and Edmonds (1978) both names are used.

Distribution and habitat

Originally from the western areas of North and South America. In Australia only

collected from Point Nepean, Vic., on sand in shade of *Leptospermum* and *Melaleuca*.

Only specimen

VICTORIA: Willis s.n., 8.viii.1973, Quarantine Stn Res., Point Nepean (ADW, MEL).

*4. *Solanum furcatum* Dunal in Poir., Encyc. Meth. Bot. Suppl. 3 (1814) 750.

Type citation: "M. Dunal a décrit cette plante sur des échantillons que Dombey a rapportés du Perou".



Fig. 3. *Solanum furcatum* Dunal. Drawn from pot grown plant at the Waite Institute, from seed from J. Edmonds, Cambridge, originally from California (ADW 42421). $\times \frac{2}{3}$.

Type specimen: Not seen. Edmonds (1972) 107, cites holotype (P).

Literature

Dunal (1816) 13; Don (1837) 412; Walpers (1844) 49; Dunal (1852) 51; Stebbins & Paddock (1949) 74; McBride (1962) 168; Curtis (1967) 504; Edmonds (1972) 107; Everist (1974) 472; Henderson (1974) 58.

A soft woody *perennial* with straggling stems to 1 m long, internodes both relatively long and slender. All parts sparsely pubescent with minute, curved, appressed, simple hairs. *Leaves* 3-9 x 2-5 cm, ovate-lanceolate, entire or sinuate-dentate with obtuse lobes, tip acute; petiole 1-3 cm generally winged in the upper part. *Inflorescence* pedunculate, simple or furcate, 1-2 cm to the division, each branch with 4-14 flowers; pedicel 1 cm. *Calyx* lobes rounded. *Corolla* 1.5 cm diam., stellate, white with a yellowish star, often reflexed. *Filaments* (Fig. 159) 1-2 mm; anthers about 3 mm, erect. *Style* pubescent below, exerted 1.5-2 mm beyond the anthers; stigma capitate. Mature *fruit* (Fig. 148) 6-8 mm diam., globular, purplish-black, readily shed with its pedicel when ripe; pedicel 1-1.5 cm; calyx scarcely enlarged, appressed. *Seeds* 2 mm long, light brown, about 22 per fruit; sclerotic granules about 10, relatively large, 1 mm long in the one sample grown. (Fig. 3.) *Chromosome number:* $2n = 6x = 72$, Stebbins & Paddock (1949); Edmonds (1972:107); however Randell & Symon (1976:378) reported $n = 24$ and another check on the Australian material is desirable.

Notes

Dunal indicates two forms α *glabratum* v.s.h. Mus. Par. and β *pilosum* v.s.h. Juss. Neither Edmonds (1972) nor Henderson (1974) discuss these.

Distribution

Originally from Peru, Chile and Juan Fernandez (Edmonds, 1972), now also in N. America and possibly established in Tas. at Copper Creek and in Vic, where a few collections have been made.

Specimens examined

VICTORIA: *Willis s.n.*, 18.ix.1973, head of Dabyminga Creek, Mt Tallarook (ADW), and plant grown from this collection.

TASMANIA: *Curtis s.n.*, v. 1947, Copper Creek near Smithton (HO).

*5. *Solanum chenopodioides* Lamk., Tabl. Encycl. 2 (1794) 18.

Type citation: "Ex. ins. Mauritiana".

Type specimen: P. Herb. Lamk., fide Morton (1976:145), not seen, photo ADW.

The correct name for the plants in Australia known in recent times as *S. gracilius* Hert. has been difficult to establish. Following Morton's (1976:144) use of the above name, the names and types have been re-examined by J. Edmonds who in a letter 8/8/1977 states: "The Lamarckian type specimen in Paris is undoubtedly the same as the type specimens of *S. sublobatum* Willd. *S. gracile* Dunal, and *S. gracilius* Hert. etc." Since it was published earlier it should therefore be the correct name for this taxon if Morton's argument is right. See also Henderson (1974:46), (1977:20), Edmonds (1979:226).

Solanum sublobatum Willd. ex Roem. & Schult., Systema Vegetabilium 4 (1819) 664.

Type citation: Material from Argentina.

Type specimen: Not seen. Edmonds (1972) 105, cites Herb. Willd. 4336 (B).

Solanum gracile Dunal in DC., Prod. 13 (1852) 54, non Sendtn. in Mart. Fl. Bras. 10 (1846) 13.

Type citation: "In Brasiliae provincia Rio de Janeiro (Gaudich. pl. exs. no. 530 in h. DC. et h. Mus. Paris), circa Buenos-Ayres (Commerçon in h. Mus. Paris), in Montevideo (Commerçon et Gay, in herb. Mus. Paris), in Chili ad Raneagua (Bertero n. 639 in herb. Mus. Paris), e sem. horti Berol. in hort. Monsp. et Genev. cultum". Not seen. Edmonds (1979) 226, cites "Argentina, Commerçon s.n. (P); Brasil, Gaudichaud 520 (G-DC, P); Uruguay, Commerçon s.n. (P); Gay s.n. (P); Jard. de Geneve, aout 1832, Dunal s.n. (G-DC), et non chile Bertero 639 (P) = *S. furcatum* Dunal".

Literature

Marcello (1904) as *gracile*; Vilmorin & Simonet (1927) 164 as *gracile*; Kagawa (1937) 133 as *gracile*; Larsen (1943) 1 as *gracile*; Westergaard (1948) 1 as *gracile*; West & Emmel (1952) as *gracile*; Baylis (1958) 379 as *gracile*; Soria & Heiser (1961) 245 as *gracile*; Kingsbury (1964) 290 as *gracile*; Cabrera (1965) 217 as *gracile* and *sublobatum*; Heiser, Soria & Burton (1965) 471 as *gracile*; Ooststroom & Reichgelt (1966) 159 as *ottonis*; Edmonds (1972) 105 as *sublobatum*; Willis (1972) 552 as *ottonis*; Everist (1974) 472 as *gracilius*; Henderson (1974) 46 as *gracilius*; Morton (1976) 144; Edmonds (1979) 226.



Fig. 4. *Solanum chenopodioides* Lamk. Drawn from field grown plant at the Waite Institute, from seed from K. Ingram, from Mt Tomah, NSW (ADW 40794). $\times 2/3$.

Common name: whitetip nightshade.

A sprawling, soft wooded *herb* to 1 m lasting a few years, green or greyish green in aspect, pubescent with short, erect or curved, few-celled hairs. Lower younger *leaves* 9 x 6 cm, ovate, later leaves smaller 4-7 x 2-3 cm, lanceolate, leaves on old stems even smaller 2 x 1 cm, all relatively unlobed, the larger leaves having a slightly undulate or shallowly lobed margin, later leaves entire and acute or acuminate. *Inflorescence* an umbel of 5-10 white flowers; peduncle 1.5-2 cm long; pedicels 5-8 mm. *Calyx* lobes 1 mm. *Corolla* 1.5-2 cm, stellate, often reflexed, white, relatively conspicuous. *Filaments* (Fig. 159) c. 1 mm, pubescent; anthers 3 mm, oblong. *Style* and stigma usually projecting beyond the anthers. Fruiting peduncles usually distinctly and sharply deflexed from the base; peduncles 1.5-3 cm, relatively long; *fruits* (Fig. 148) 5 mm diam., globular, opaque, often very black. *Seeds* (17-) 32 (-51) per fruit, 1-1.5 mm long, mature cleaned seed light brownish-yellow; no sclerotic granules seen. (Fig. 4.)

Chromosome number: $n = 12$, Fedorov (1969:697) as *S. gracile* Otto, lists earlier counts and also the numbers $2n = 36, 48, 72$. In view of the problems of identification the variant counts should be accepted with caution: Edmonds (1972:98) as *S. sublobatum*; Henderson (1974:12) as *S. gracilius*; Randell & Symon (1976) as *S. gracilius*.

Distribution and habitat (Map 17a)

Eastern Australia in subcoastal sites from extreme south eastern Qld through N.S.W. to eastern Vic. Found on embankments, on hill slopes and commonly in gullies or on river banks. Native to South America and now established in North America, Europe, Australia and New Zealand.

Note

When grown in the field at Adelaide all collections survived the winter and continued growth as straggly small leaved shrubs.

Selected specimens (total seen about 50)

Henderson (1974) cites an extended list of specimens.

QUEENSLAND: *Henderson 301*, 20.x.1967, Clapham Junction, Brisbane (ADW, BRI).

NEW SOUTH WALES: *Constable 5630*, 14.i.1965, Cape Solander (ADW, NSW, and cult. matl to BIRM, NSW); *Constable 6161*, 11.x.1965, Douglas Park, Nepean River (ADW, NSW); *Ingram s.n.*, 30.i.1966, Mt Tomah, (ADW and cult. matl. to NSW); *Coveny 742*, 9.i.1969, near Gunderman, Hawkesbury River (ADW, NSW).

VICTORIA: *Beaulehole 37803*, 5.iv.1971, East Gippsland (acb, ADW, MEL).

*6. *Solanum nigrum* L., Sp. Pl. 1 (1753) 186.

Lectotype: Herb. Linnaeus No. 248. 18 (LINN, microfiche AD).

For discussion on typification see Henderson (1974:25), who also gives synonymy relevant to Australia (loc. cit.: 19). Further synonymy is given by Stebbins & Paddock (1950:70), and Baylis (1958:379) and especially by Wessely (1960:290). I have included *S. nigrum* ssp. *schultesii* (Opiz) Wessely within my concept of the species.

Literature

This species and its relatives now have an extremely extensive literature and references are given in two sections; due to much taxonomic confusion all should be interpreted with caution.

1). *Australian references*—Brown (1810) 445; Bentham (1868) 446; Mueller (1868) 145; Wools (1869) 41; Bailey & Tenison-Woods (1879-80) 171; Bailey (1880-81) 16; Bailey (1881) 1; Mueller (1882) 95; Bailey (1883) 342; Mueller (1888) 361; Tate (1890) 144; Moore (1893) 332; Bailey (1901) 1079; Rodway (1903) 137; Bailey (1906) 119; Dixon (1906) 221; Black (1909) 114; Ewart (1909) 45; Cheel (1911) 158; Bailey (1913) 354; Adcock (1915) 56; Maiden & Betche (1916) 181; Ewart & Davies (1917) 243; Cheel (1917) 583; Cambage (1918) 708; White (1918) 151; Black (1926) 496; Domin. (1928) 1126; Ewart (1931) 1003; White (1933) 583; White (1937) 225, 230.

2). *Non-Australian references*—Dunal (1813) 152; Dunal in Poiret (1814) 741; Dunal (1816) 12; Don (1837) 412; Walpers (1844) 47; Dunal (1852) 50; Sendtner in Martius (1856) 16; Hooker (1864) 200; Clarke (1883) 229; Cheeseman (1906) 481; Standley (1924) 1296; Britton (1935) 90; Nakamura (1937) 57; Standley & Morton (1938) 1087; Allan (1940) 197; Larsen (1943) 1; Salisbury (1942) 78; Santapu (1948) 652; Westergaard (1948) 1; Stebbins & Paddock (1949-50) 70, 79; Podjarkova (1955) 25; Baylis (1958) 379; Wessely (1960) 290; McBride (1962) 171; Heine (1963) 335; Wakhloo (1964) 237; Backer & Bakhuizen (1965) 471; Heiser et al (1965) 471; Smith & Downs (1966) 55; Oostroom & Reichgelt (1966) 156; Saarisalo-Taubert (1967) 87; Chennaveeraiah & Patil (1968) 23; Merxmüller (1969) 10; Saxena & Singh (1969) 148; Venkateswarlu & Rao (1969) 400; Heine (1976) 148; Morton (1976) 153.



Fig. 5. *Solanum nigrum* L. Drawn from field grown plant at the Waite Institute, from seed from Symon 5449, collected 66 km north of Geraldton, WA (ADW 35964). $\times \frac{2}{3}$.

Common name: black nightshade, black berry nightshade.

A herb or soft wooded *shrub* often lasting several years, sometimes annual, frequently with a dark green or purple-green aspect especially in winter, pubescent with curved, appressed, simple hairs and with almost sessile glandular ones. *Leaves* ovate, 4-7 x 2-5 cm, juvenile ones entire, later leaves shallowly and bluntly toothed with 2-10 lobes; the leaf edges sometimes undulate; petioles 1-3 cm, flattened and narrowly winged in the upper portion. *Inflorescence* a short raceme of 4-8 flowers; peduncle 1-2 cm, rather erect; floral axis 3-5 mm; pedicels c. 7 mm, spreading in flower, rather deflexed in fruit. *Calyx* lobes hardly 1 mm long, acute. *Corolla* c. 1 cm diam., stellate; the lobes acute and appressed, pubescent outside. *Filaments* (Fig. 159) 1.5 mm, sparsely pilose below; anthers 2 mm, oblong. *Ovary* globular, glabrous; style 5 mm, lower half pilose; stigma capitate and placed at or above the level of the anther pore openings. Mature *fruit* (Fig. 148) in trusses of 5-8, dull black or purple-black, c. 6-8 mm diam., not conspicuously deciduous when ripe and then generally falling without the pedicel; mature calyx lobes appressed or scarcely reflexed, not enlarged; the lobes bluntly triangular, with an acute or rounded apex. *Seeds* 25-35 per fruit, 2 mm long, bone-colour; sclerotic granules rarely present. (Fig. 5.)

Chromosome number: $n = 36$. There are numerous overseas counts, Fedorov (1969:599); for Australian counts Henderson (1974:11); Randell & Symon (1976:371) and in addition to the vouchers cited there the following have also been confirmed as $n = 36$. Their localities and vouchers (all at ADW) are: *W.A.*: Kojonup 35953, Geraldton 35964, South Perth 35963, Mt Barker 35970, Kalgoorlie 35976, Sandstone 35977. *N.T.*: Corroboree Rock 35957. *Qld*: Kentville 35978; Normanton 35965. *N.S.W.*: Epping 35954; Back Yamma 35955; Newcastle 35956; Thackaringa 35960; Brewangle 35961. *Vic.*: Gorae West 35973; Keegans Bend 35974. *S.A.*: Koonalda Cave 32835; Wilpena 35949; Adelaide Hills 35950; Adelaide Hills 35951; Pt Clinton 35952; Yalunda Flat 35966; Cummins Road 35967; Eyre Peninsula 35968; Pt Lincoln 35969; Pt Willunga 35971; Cape Jervis 35972; Waterloo 35975.

Notes

Solanum nigrum and its allies form a group of species the biology of which is complex and the nomenclature of which now forms a taxonomic morass almost unequalled in botany. Not only are there a number of closely related species and variants widely spread but the indigenes have been partly overwhelmed by weedy species extensively distributed by man. There is also little doubt that seeds are widely spread by birds so that plants may be found in relatively isolated sites such as the sink holes on the Nullarbor Plains. It is now difficult to separate true native species or forms from early introductions. This has contributed to nomenclatural problems where, particularly in Europe, narrow species concepts and innumerable varietal names and new combinations have made the accurate application of names extremely difficult. This problem is even greater when work is attempted at centres without extensive literature resources and where it is almost impossible to trace or see the appropriate type specimens. Wessely (1960) for example deals with 3 species and their varieties in middle Europe and allocates over 100 names of varied rank between them. Stebbins & Paddock (1950), Baylis (1958) and Henderson (1974) make no pretence at a full synonymy.

A polyploid series occurs in the section *Solanum* and diploids, tetraploids and hexaploids ($2n = 24, 48, 72$) occur. Although the name *S. nigrum* L. has been used very widely it has been accepted by a number of modern authors (Stebbins & Paddock, Baylis, Jorgensen, Henderson, Edmonds) to apply to a hexaploid species and where cytological information has been available this has assisted in separating taxa even if the correct naming still remains unresolved.

When collections can be grown together it is reasonably easy to distinguish different

biotypes but it is difficult to distinguish clear cut specific limits. In the case of the aliens the populations established in Australia probably represent only a small portion of the natural variability and this certainly seems to be the case in *S. nigrum* where overseas collections differed more between themselves than did the Australian material.

However, several distinctive biotypes occur which can be recognised in the field but are much more difficult to determine from dried material. The most common widespread form is a vigorous bushy plant often decidedly purplish in aspect and having a greater tendency to be perennial. The second tends to be lower, greener, with more lobed leaves and with larger berries. It is earlier flowering and more often annual. I have retained a broad species concept and have not been convinced of the utility of separating and naming many variants.

A number of Indian workers, e.g. Bhadhuri (1945), Chennaveeraiah & Patil, (1968), Rao (1971), Saxena & Singh (1969), Tandon (1969), Tandon & Rao (1964, 1966a, 1974), Venkateswarlu & Krishna (1967), and Rao et al. (1978:64), have steadily continued to use the name *S. nigrum* for a number of species which obviously include *S. nigrum* L., *S. americanum*/*S. nodiflorum* Jacq. and *S. villosum* Mill. as usually recognised by other workers.

Variants with narrower and/or smaller leaves have been collected, particularly about the Adelaide Hills and were referred to by Henderson (1974:27). Some have more intense anthocyanin colouring, others are almost completely sterile or have malformed flowers. These have been demonstrated to be due to virus attack. Two examples only are *Symon* 7631, 3.iii.1972, Devils Elbow, Mt Barker Road, S.A. (AAU, ADW, B, BRI, CANB); *A.C. Beaglehole* 25068, 5.iv.1968, Mt William Crk 5.6 km SE of Pomonal, Vic (acb, ADW).

Distribution and habitat (Map 16)

All States. Widely distributed throughout the settled areas, more common in the winter rainfall zones, less common in the northwest, the extremely arid areas, and the wet tropical coast of eastern Australia. Generally growing in disturbed sites about domestic gardens, stock yards and troughs, a weed of heavily fertilised horticultural crops, e.g. potatoes.

Selected specimens (total seen about 300)

Henderson (1974) cites an extended list of specimens.

WESTERN AUSTRALIA: *Symon* 5449, 4.vii.1967, 66 km N of Geraldton (ADW, B, CANB, PERTH); *Symon* 10310, 2.vi.1975, Bedford Downs Stn Hstd (ADW, CANB, PERTH); *Wilson* 6754, 14.v.1968, Kalbarri National Park (ADW, PERTH).

NORTHERN TERRITORY: *Nelson* 1499, 15.vi.1967, Trucking Yards, Alice Springs (ADW, NT); *Nelson* 1959, 10.ix.1969, Todd River Stn (ADW, NT); *Maconochie* 114, 7.iv.1967, Plenty River (ADW, NT).

QUEENSLAND: *Symon* 4954, 29.v.1967, 64 km SW of Normanton (ADW, BRI, CANB); *Henderson* 1242, 8.ii.1972, 8 km NNE of Stanthorpe (ADW, BRI).

NEW SOUTH WALES: *Pickard & Coveny* 1216, 10.vi.1969, Turrell Crk, Kars Springs (ADW, BRI, NSW); *McKee* 8944, 4.ii.1962, Black Mntn, Canberra (ADW, CANB); *Briggs* 2724, 20.v.1969, 58 km NNW of Wilcannia (ADW, NSW).

VICTORIA: *Beaglehole* 29875, 28.xi.1968, Mitre Rock, N of Mt Arapiles (acb, ADW, MEL); *Beaglehole* 44286, 15.iii.1974, SSE of Colac (acb, ADW); *Beaglehole* 25280, 11.vi.1968, Dundas Range, Grampians (acb, ADW, MEL).

SOUTH AUSTRALIA: *Symon* 4531, 17.ii.1967, Koonalda Cave (ADW, CANB, K, NSW); *Symon* 8164, 5.x.1972, Gawler Ranges (ADW, CANB, MO); *Symon* 5945, 22.viii.1968, Moolawatana Stn (ADW, CANB, DAV).

*7. ***Solanum retroflexum*** Dunal in DC., Prod. 13 (1852) 50.

Type citation: "In promont. Bonae Spei, in 1838, (*Drege* 7864); in Arabia circa Taifa (a Mus. Paris, mihi comm. n. 29)."

Syntypes: G-DC, not seen, microfiche AD. (Henderson, 1974:60).

Literature

Westergaard (1948) 1-18; Henderson (1974) 60; Everist (1974) 473.



Fig. 6. *Solanum retroflexum* Dunal. Drawn from field grown plant at the Waite Institute, from seed from C.R. Alcock, collected from Pillie Water Hole, Eyre Peninsula, SA (ADW 41010). $\times 2/3$.

In cultivation a rounded, spreading annual *herb*, distinct in habit from *S. nigrum*, general aspect bright green, pubescent with short, curved, simple, uniseriate, multicellular hairs. *Leaves* ovate to ovate-lanceolate, with c. 6-9 well developed lobes, these more conspicuous during all stages of growth than those in *S. nigrum*, the leaf margin not usually as undulate as in *S. nigrum*, and leaves tapering to the upper part of the petiole. *Inflorescence* a small umbel of 3-6 white flowers; peduncle 1 cm long; pedicels 5 mm long. *Calyx* lobes distinct, 1 mm long. *Corolla* c. 1 cm diam., stellate. *Filaments* (Fig. 159) 0.5 mm long, slightly pubescent; anthers 1.5 mm long, oblong. *Ovary* glabrous; style 2 mm long, pubescent below and projecting just beyond the anther tips. Fruiting peduncle 2 cm long, standing out stiffly, not deflexed; fruiting pedicels curved, deflexed, 1 cm long; *fruit* (Fig. 148) globular, c. 7 mm diam., dull black. *Seeds* 2 mm long, mature cleaned seed light brownish yellow or stained purple, (15-) 25 (-35) per fruit. (Fig. 6.)

Chromosome number: $n = 24$ Henderson (1974); Symon & Randell (1976).

Notes

In cultivation at Adelaide the species behaved as an annual and died about midwinter. The plants fruited very freely.

Dr J. Edmonds (Cambridge), who is currently working on a major revision of the section *Solanum*, has to date concentrated on the species in S. America and has not yet published on this species. There is very little literature relevant to it. The species is one of the few tetraploids with dark berries.

Distribution and habitat (Map 19)

Originally from South Africa now sparingly localised on Eyre Peninsula, S.A.

Selected specimens (all cited)

SOUTH AUSTRALIA: *Alcock* 1268, xi. 1966, Pillie Waterhole, Eyre Peninsula (AD, ADW); *Alcock* 2099, 27.iv.1968, Pillie Waterhole (ADW, B, BIRM, CANB, K); *Copley* 1838, 25.i.1968, Hd of Wiltunga; Sect. 200 (AD).

*8. *Solanum sarrachoides* Sendtn. in Mart., Fl. Brasil 10 (1846) 18.

Type citation: "Brasilia australis: Sellow. Chile: Pöppig (ramulis firmioribus, cymis 2-5 floris)".

Type material: Not seen. Edmonds (1972) 102, cites *Sellow s.n.* (P) and Henderson (1974) 50, cites *Poeppig s.n.* (A, W), the specimens of both collections originally at B having been destroyed.

S. nitidibaccatum Bitt., Repert. Spec. Nov. Regni Veg. Beih. 11 (1912) 208.

Type citation: "*S. sarrachoides* Sendtn. in Flora Brasil X (1846) 18 p. pte. (pro planta Chilensi a cl. Poeppig collecta) et auctorum plurimorum".

Type specimen: Not seen. Morton (1976:124) cites *Poeppig* 538, a possible isotype at W, not seen. Henderson (1974:50) cites possible isotypes at A and W, and Edmonds (1972:102) cites *Poeppig* 538 as a possible isotype.

Literature

These references are to both *S. nitidibaccatum* and to *S. sarrachoides*. Bitter (1912) 208; Ellison (1936) 473; Larsen (1943) 1; Westergaard (1948) 1; Nilsson (1958) 654; Miltzer (1964) 663; Ooststroom & Reichgelt (1966) 160; Curtis (1967) 505; Saarisalo-Taubert (1967) 87; Edmonds (1972) 102; Willis (1972) 551; Beadle, Evans & Carolin (1972) 489; Everist (1974) 472; Henderson (1974) 50; Morton (1976) 121, 124; Edmonds (1979) 232.

A sprawling annual *herb* to 50 cm, but sometimes flowering when quite small, c. 10 cm, pubescent with slender, gland tipped hairs of varied length to 1 mm long, sessile glands also occur. *Leaves* on vigorous growth 6 x 4 cm but more often smaller and commonly about 3 x 2 cm, ovate, entire or with 9-10 blunt, shallow lobes. *Inflorescence* a short raceme of 2-6 white flowers; peduncle 1 cm long; inflorescence rhachis less; pedicels

5-7 mm long. *Calyx* campanulate, with 5 broad acute lobes, each 2 mm long. *Corolla* 12mm diam., stellate-pentagonal, white. *Filaments* (Fig. 159) 2 mm long, pilose on the lower portion; anthers 1.5 mm long, narrow-oblong. *Style* 4 mm long, densely pubescent below with minute glandular hairs; stigma projecting just beyond the anther pores. Ripe *fruit* (Fig. 148) 5-6 mm diam., readily shed with its pedicel, shining, translucent, green to slightly purplish-green, contents partly visible; calyx enlarged in fruit, 5 mm long, campanulate, appressed and covering about half the fruit. *Seeds* 2 mm long, light brown, (13-) 19 (-23), in the 19 fruits counted usually 2 sclerotic stone cells per fruit. (Fig. 7.)



Fig. 7. *Solanum sarrachoides* Sendtn. Drawn from pot grown plant at the Waite Institute, from seed from *Beaulehole* 37084, collected at junction of Mt Baldhead and Swifts Creek Road, East Gippsland, Vic. (ADW 40512). $\times \frac{2}{3}$.

Chromosome number: $n = 12$ Fedorov (1969) as *S. sarrachoides*; Henderson (1974), Randell & Symon (1976) as *S. nitidibaccatum*.

Notes

Whether *S. sarrachoides* Sendtn. and *S. nitidibaccatum* Bitt. are synonymous may be answered when the studies of this group by Edmonds are completed. In her synopsis of the South American species, Edmonds (1972) maintains *S. sarrachoides* Sendtn.; however others (see Henderson, 1974) have used the name *S. nitidibaccatum* Bitt. I am not at the moment convinced of the distinctiveness of the two species and prefer to retain the older name.

Distribution and habitat (Map 19)

Originally from warm temperate areas of South America, now naturalised in North America, Europe and Australia, it is now sparingly established in all States except N.T. and W.A.

Selected specimens (total seen about 20)

QUEENSLAND: *Henderson & Parham 1241*, 8.ii.1972, 8 km NNE of Stanthorpe (ADW, BRI); *Ex Henderson 1260*, 1972, Toonumbar (cult) (ADW).

NEW SOUTH WALES: *Green s.n.*, Jan. 1960, Cowra (NSW); *Madsen s.n.*, 15.ii.1951, Blayney district (NSW).

VICTORIA: *Willis s.n.*, 30.iii.1964, Creswick (MEL); *Beaglehole 41744*, 23.iv.1973, Mitchell River, Angusvale (acb, ADW, MEL); *Beaglehole 37084*, 27.ii.1971, East Gippsland, junction of Mt Baldhead and Swifts Creek Road (acb, ADW, MEL).

TASMANIA: *Cock s.n.*, Apl 1952, National Park ?Hobart, cultivated ground (HO); *Paton s.n.*, 1968, Launceston (ADW).

SOUTH AUSTRALIA: *Dunstone s.n.*, 5.iv.1952, Torrens River, Paradise (ADW).

*9. *Solanum scabrum* Mill., Gard. Dict. ed. 8 (1768) No. 6.

Type citation: Cultivated Chelsea Physic Garden.

Lectotype: Herb. Miller (BM, photo ADW). For discussion of typification see Henderson (1974:61); Edmonds (1979:224).

Solanum guineense (L.) Lamk., Tabl. Encycl. 2 (1794) 18, no. 2339 based on *Solanum nigrum* var. *guineense* L., Sp. Pl. (1753) 186.

Literature

Cheel (1917) 590; Soria & Heiser (1959) 33; Heine (1960) 245; Harborne (1966) 524; Heiser (1969) 63; Everist (1974) 472; Henderson (1974) 61; Edmonds (1979) 224.

A somewhat coarse *annual* or short lived perennial *herb* to 1 m tall, erect and branching above, glabrous or sparsely pubescent with appressed, unbranched, curved hairs. Lower *leaves* to 13 x 8 cm, later leaves smaller and about 7 x 5 cm, ovate to broadly elliptic, apex acute to acuminate, entire or slightly sinuate, base cuneate into the narrowly winged petiole; petiole 1.5-7 cm long, narrowly winged above. *Inflorescence* a congested or subumbellate cyme, rarely forked, of 9-12 flowers; peduncle 2-3 cm long at anthesis, spreading, erect; floral rhachis congested with short internodes; pedicel 0.5-1 cm long. *Calyx* c. 1.5 mm long, campanulate, the lobes bluntly triangular. *Corolla* 1.5-2 cm diam., stellate, white. *Filaments* (Fig. 159) 1 mm long, relatively stout, pubescent below; anthers 3 mm long, oblong, opening by large terminal pores and lateral slits, distinctly brown in colour. *Ovary* ovoid, green, glabrous; style 4 mm long, pubescent in the lower half with upwardly pointing hairs; stigma capitate, green, at the level of the anther pores. Fruiting peduncle 2-4 cm long, ascending or spreading, relatively firm and thick with 4-10 fruits; pedicel 1-1.5 cm long, erect or decurved; calyx not much enlarged; *fruit* (Fig. 148) 1-1.5 cm diam., globular or depressed-globular, purple-black, glossy. *Seeds* 2 x 1-1.5 mm long, obovate, slightly pointed at the narrower end, minutely reticulate, pale or stained purple. (Fig. 8.)

Chromosome number: $n = 36$ Fedorov (1969) as *S. guineense*; Henderson (1974:63). $n = 24$ D. Jewell (unpublished) counted from plants grown from *Dept. of Agric. No. 37* cited below.

Notes

The area of origin of this species is uncertain. It is occasionally cultivated but is nowhere important as a food plant. It does not appear to be naturalised and all plants seen have been grown deliberately, in the most recent case under the belief that they were American blueberries. For further general discussion of this species see Henderson (1974).



Fig. 8. *Solanum scabrum* Mill. Drawn from pot grown plant from seed collected from a garden in Fullarton, SA (ADW 48417). Many flowers had six petals. $\times \frac{2}{3}$.

Distribution and habitat

Occasionally cultivated in gardens as a novelty. Not known to be naturalised.

Selected specimen

SOUTH AUSTRALIA: *Dept of Agric.* 37, 4.i.1976, cult. Fullarton Garden (ADW).

*10. *Solanum villosum* Mill., *Gard. Dict.* ed. 8 (1768) No. 2.

Type: Cultivated Chelsea Physic Garden.



Fig. 9. *Solanum villosum* Mill. Drawn from pot grown plant at the Waite Institute, from *Dept of Agric.* 582, collected in SA (ADW 42435). $\times \frac{2}{3}$.

Lectotype: Herb. Miller (BM, photo ADW). For discussion of typification see Henderson (1974:54); (1977:18); Edmonds (1979:214).

Synonymy: Wessely (1960:314) as *S. luteum*; Henderson (1974:54); Edmonds (1979:214).

Literature (as *S. alatum*, *miniatum*, *luteum* and *villosum*)

Dunal (1813) 157; Poiret (1814) 741; Don (1837) 413; Walpers (1844) 50; Vilmorin & Simonet (1827) 164; Polgar (1926) 30; Britton (1935) 90; Blom (1936) 195; Guth (1938) 217; Larsen (1943) 1; Waller (1944) 80; Westergaard (1948) 1; Stebbins & Paddock (1949) 74; Wessely (1960) 290; Soria & Heiser (1961) 245; Magoon *et al.* (1962) 151; Heiser, Soria & Burton (1965) 471; Ooststroom & Reichgelt (1966) 154; Saarisalo-Taubert (1967) 87; Tandon (1969) 688; Everist (1974) 473.

A bushy annual *herb* to 70 cm tall, sometimes surviving more than one season, slightly or densely greyish villous-pubescent with simple or glandular hairs, never stellate, unarmed. *Leaves* ovate, on vigorous shoots to 8 x 6 cm but usually less, on mature growth about 4 x 3 cm, early leaves almost entire, later leaves with 5-7 shallow lobes. *Inflorescence* a subumbellate raceme of 3-6 white flowers; peduncle about 1 cm long; pedicel 1 cm long, hirsute. *Calyx* lobes acute to acuminate. *Corolla* 12 mm diam., white, stellate but the lobes broader and not so deeply cut as in others of this group so that the flowers appear slightly more showy and whiter, often reflexed. *Filaments* (Fig. 159) 2 mm long, pilose below; anthers 1.5 mm long, oblong. *Style* 4-5 mm long, pilose below. *Fruit* (Fig. 148) subglobular, 5-7 mm diam., usually slightly longer than broad, dull orange-red (close to RHS Mars Orange 013, or RHS Saffron Yellow 7/2, or RHS Yellow Ochre 07), translucent, the seeds visible, (19-) 30 (-40) *seeds* per fruit, no sclerotic granules present; calyx not enlarged, finally recurved; pedicels usually markedly deflexed. (Fig. 9.)

Chromosome number: $n = 24$, Henderson (1974); Randell & Symon (1976); Fedorov (1969) for earlier counts.

Notes

For more extended discussion on this species see Henderson (1974). There is considerable variation in the group of tetraploid species with yellow, orange or reddish fruits, and species delimitation within this group is not yet complete. As Henderson points out, Stebbins & Paddock (1949) appear to be the first authors to treat the names *S. luteum* and *S. villosum*, which were published together, as synonyms and they chose *S. villosum*. Unfortunately this was not followed by Wessely (1960), nor Hawkes & Edmonds (1972), so that both names are likely to continue in use for some time.

Distribution and habitat (Map 19)

This species is possibly of southern European origin and has become sparingly naturalised in temperate areas of Australia.

Selected specimens (total seen about 5)

WESTERN AUSTRALIA: *Preiss* 1967, 1830-41, Swan River, Perth as *Sol. rubrum* L. and therefore possibly *S. villosum* recorded in *Plantae Preissianae*, specimen not seen.

QUEENSLAND: *Symon s.n.*, 29.vii.1968, Mareeba, seed ex *Henderson* 351 (ADW).

SOUTH AUSTRALIA: *Dept Agric.* 582, 1.vi.1969, no locality (ADW); *Manisty s.n.*, 13.iv.1961, Strathalbyn (ADW).

Section 2. *Leiodendra* Dunal, *Solan.* syn. (1816) 20.

Lectotype species: *S. nudum* Dunal.

This section includes shrubs and small trees. They are unarmed and pubescent with simple or branched hairs but generally glabrescent. The leaves are simple and mostly entire. The inflorescence is a condensed fascicle or cincinnus in a subaxillary position, with stellate often white flowers. Anthers are oblong, opening by terminal pores. The berry is succulent and may be orange-red or black in colour.

The section is restricted in its distribution to Central and South America. A single species is naturalised in the rain-forest areas on the Qld-N.S.W. border.

*11. *Solanum callium* Henderson, *Austrobaileya* 1 (1977) 13-18.

Types: 28° 27'S, 152° 42'E; c. 35 km NW of Kyogle, N.S.W., Dec. 1968, *Henderson H489* (flowers) (holo.: BRI 178893; iso.: BRI 178894, K, NSW, CANB); 28° 18'S, 152° 55'E, Levers Plateau, Qld/N.S.W. border, c. 90 km SSW of Brisbane, Apr. 1972, *Henderson H1289* (fruits) (paratyp. BRI 198961/2, K, NSW, CANB).



Fig. 10. *Solanum callium* R.J. Henderson. Drawn from pot grown plant at the Waite Institute, from seedling collected with *Henderson 1259*, from Toonumbar State Forest, 26 km north-west of Kyogle, NSW (ADW 42149, fruit from ADW 41110). $\times \frac{2}{3}$.

Literature

Bird et al. (1976) 3653.

A woody *shrub* 2-3 mm high, becoming open and straggly with age, unarmed, general aspect green, glabrous except for tufts of simple, uniseriate, multicellular hairs in the axils of the main veins below the leaves, a few hairs alongside the main veins, and small papillose hairs at the petal tips. *Leaves* 7-18 x 2-5 cm, elliptic, entire, apex acute, base cuneate; petiole about 2 cm long, grooved above, narrowly winged almost to base. *Inflorescence* a short cyme of 5-10 (-30) flowers; peduncle 2-10 mm long; floral rhachis 1-5 mm long congested; pedicel 1-1.5 cm long, slender. *Calyx* short and almost truncate, lobes 0.5-1 mm long, rounded, acumens not developed. *Corolla* to 1.5 cm diam., white, deeply stellate, lobes c. 3.5 mm wide, interacuminal tissue very narrow and often revolute. *Filaments* (Fig. 149) 0.5 mm long; anthers 3 mm long, orange, erect round the 6 mm long straight style. *Ovary* 2 mm long, ovoid, glabrous. Fruiting pedicels 2 cm long, slightly swollen above; calyx not much enlarged; *fruit* (Fig. 148) 1-1.5 cm diam., globose, glabrous, bright orange-yellow (close to RHS Yellow Ochre 07), succulent. *Seeds* 3-4 mm long, flattened, margin slightly thickened, light yellow-brown, 69, 78, 79, 93 counted in 4 fruits. (Fig. 10.)

Chromosome number: $n = 24$ Randell & Symon (1976) as *S. aff. superficiens*.

Notes

The identity of this species has been a problem ever since it was first collected in 1913. The manuscript name *callium* was given it by C.T. White but this was not published at the time. The species belongs to the section *Leiodendra* Dunal of the subgenus *Solanum*. This section is not otherwise represented in Australia (or S.E. Asia) and the centre of speciation for the section is in tropical America. It is therefore doubtful if the species is truly native to Australia. However, it has not been possible to identify it with any American species to date despite assistance from Dr W. D'Arcy. It approaches the species *S. triste* Jacq., *S. nudum* H.B.K., *S. undatifolium* Dunal and *S. caavurana* Vell. but agrees with none and, in view of the number of species still to be named in tropical America, it may not have an earlier scientific name. If it is considered to be an Australian native it raises substantial phytogeographical problems (cf. *S. erianthum*). Although a large shrub it was not collected until 1913. Furthermore, recent collections suggest that it might be spreading. These two facts would support the contention that it is an alien. For some time it was called aff. *S. superficiens* Adelb. a species named from Java, but it does not agree with that taxon satisfactorily, although specimens have been distributed under that name. It is of interest that the plant was established in Australia before named in Java. The plant has relatively large succulent fruits and could well be spread by fruit pigeons.

Distribution and habitat (Map 20b)

Qld, in the far S.E., and N.S.W., in the far N.E. in the vicinity of the McPherson Ranges. It has been collected from cleared patches and along roads and tracks in rain-forest on soils derived from basalts.

Selected specimens (total seen about 12)

QUEENSLAND: *Philp s.n.*, 57/217, 18.iii.1957, Riverview E of Ipswich (BRI).

NEW SOUTH WALES: *Jombien s.n.*, 11.i.1913, Alstonville (NSW); *White 12855*, 3.vi.1945, Whian Whian (BRI, CANB, K, MEL, NSW); *Henderson 1259*, 22.ii.1972, Toonumbar State Forest (ADW, BRI, CANB, MO).

Section 3. *Petota* Dumort., Fl. Belg. (1827) 38.

Type species: *S. tuberosum* L.

The species of this section are tuber-bearing herbaceous perennials, or soft wooded sprawling vines. They have organs unarmed and pubescent with simple or glandular

hairs, the leaves often large, imparipinnate, interstitial leaflets often being present, and rarely entire. Inflorescences are racemose or paniculate, the pedicels articulating above the base. The corolla is rotate to stellate, the anthers elongate-oblong and only slightly tapered, opening by terminal pores and lateral slits. The fruit is globose to elliptic, and often greenish.

The centre of speciation of this section is in the Andes of South America. Because of its economic importance it is the section most closely studied and best understood both biologically and taxonomically. Many series have been named and described within this section and the reader is referred to the principal references for their consideration.

*12. ***Solanum tuberosum* L., Sp. Pl. 1 (1753) 185.**

Type citation: "Habitat in Peru".

Lectotype: Herb. LINN 248.12, not seen, microfiche AD (Hawkes, 1956:106).

Literature

Mueller (1888) 398; Anon (1937a) 510; Hurst (1942) 376; Salaman (1949); Correll (1962) 499, 532; Ochoa (1962); Hawkes (1963) 76; Hawkes (1967) 207, 249, 288, 364; Hawkes & Hjerting (1969) 431; Howard (1969a); Everist (1974) 480; Brucher (1975) 393.

Common name: potato

A sprawling perennial *herb* to 50 cm, regenerating each year from underground tubers (the only species of *Solanum* in Australia that has underground tubers). Vegetative parts green, somewhat succulent, sparsely pubescent, particularly on the younger parts, with simple or glandular, never stellate, few-celled hairs, without prickles. Underground stolons develop during the growth of the plant and bear tubers called potatoes. *Leaves* often large, ovate-oval in outline, pinnate with 5-9 leaflets; petiole and leaf rhachis angular in section, sometimes narrowly winged above; petiolules present, also winged; leaflets ovate, the lower ones rounded or acute, the upper ones acuminate, much smaller interstitial leaflets often present along the leaf rhachis. *Inflorescence* a leaf-opposed cymose panicle of few to 8 flowers; peduncle 5-10 cm long; pedicels 1-2 cm long, with an articulation shortly below the calyx. *Calyx* tube c. 5 mm long, calyx lobes 5-8 mm long, lanceolate, acuminate. *Corolla* subrotate to rotate-pentagonal, white or pale violet. *Anthers* (Fig. 159) 5-7 mm long, cordate below, oblong; *filaments* c. 2 mm long, short and thick. *Style* 8-9 mm long. *Fruit* (Fig. 148) 1.5-2 cm diam., globular, greenish, often sparsely produced in cultivation.

Chromosome number: $n = 24$ Hawkes (1969).

Notes

Solanum tuberosum is a crop of major importance in the temperate areas of the world and in the uplands of the Andes, where several other species are also used. No attempt will be made here to cover the tremendous amount of literature, both agronomic and taxonomic, published on this species. An introduction to the taxonomy of the section will be found in the major works Correll (1962), Ochoa (1962), and Hawkes (1963, 1967, 1969). The potato is not naturalised in Australia but frequently persists for some time about domestic refuse heaps, in fields that have been cropped, or on roadsides where potatoes have been dropped.

Distribution

Widely cultivated in temperate areas.

Selected specimen

SOUTH AUSTRALIA: Symon 10447, 9.x.1975, Lower Coorong roadside (ADW).

Section 4. *Dulcamara* Dumort., Fl. Belg. (1827) 39.*Type species: S. dulcamara* L.

Species in this section are perennial or subwoody climbers, unarmed, glabrescent or with simple hairs and the leaves simple or deeply lobed. The inflorescence is a large or small panicle, the corolla stellate, anthers oblong and opening by terminal pores. The fruit is globose, succulent, red and the seeds numerous and pale buff colour.



Fig. 11. *Solanum dulcamara* L. Drawn from herbarium specimens collected by D.E. Symon in London near Kew, and fruit from collection from Windsor (ADW 28083 and 38360). $\times 2/3$.

The type species and close relatives occur throughout warm temperate Eurasia and America, and *S. dulcamara* has become naturalised in a few temperate areas of the world.

***13. *Solanum dulcamara* L., Sp. Pl. 1 (1753) 185.**

Type citation: "Habitat in Europae, sepibus humentibus".

Type material: Not seen, Herb. LINN 248.7, microfiche AD.

Literature

Poiret (1814) 740; Don (1837) 409; Walpers (1844) 43; Dunal in DC. (1852) 78; Darwin (1867) 12, 20, 25; Clarke (1883) 229; Mueller (1888) 396; Pammel (1911); Small (1913) 587; Wisselingh (1921) 788, 815; Turrill (1935) 82; Hurst (1942) 368; Salisbury (1942) 79; Conner (1951) 94; Podjarkova (1955) 12; Mason (1957) 699; Lawrence (1960) 30; Romanovich (1960) 259; McBride (1962) 181; Sander (1963) 303; Ooststroom & Reichgelt (1966) 163; Curtis (1967) 504; Forsyth (1968); Everist (1974) 467; Sattler (1977) 29; Roberts & Lockett (1977) 505.

Common name: bittersweet, woody nightshade.

Perennial *shrub*, woody below, scrambling over and through supporting plants, slightly or densely pubescent with simple or glandular hairs, without prickles. *Leaves* to 8 x 4 cm (mid lobe), mostly less, broad-ovate to ovate-lanceolate, sometimes entire, usually with 1-4 (mostly 2) smaller lobes at the base, small lobes well separated and petiolate or broadly attached, when entire, leaf base cordate, lower leaves often simple, upper leaves lobed. *Inflorescence* a small panicle-like cluster of cymes; *calyx* lobes short and broad. *Corolla* 10-12 mm diam., deeply stellate, violet-purple, each lobe with two green nectariferous spots towards the base. *Filaments* very short, anthers (Fig. 159) 5 mm long, narrow oblong, cohering in a cone about the style. *Ovary* broadly conical, style 5 mm long, slender, erect; stigma inconspicuous. *Fruit* (Fig. 148) 5-8 mm diam., ovoid, succulent, bright red. *Seeds* 2 mm long, pale straw colour, minutely reticulate. (Fig. 11.)

Chromosome number: $n = 12$ Fedorov (1969).

Note

Much work is currently being done, particularly in eastern Europe, on this species as a possible source of alkaloid and steroid drugs.

Distribution

Curtis (1967) reports that this species is established in Tasmania.

Specimens examined

TASMANIA: *Rodway s.n.*, no details, ?Hobart (HO); *Curtis s.n.*, 20.i.1943, Proctors Rd, Hobart (HO); *Dept of Agric. Tas. s.n.*, 5.v.1960, no details (HO).

***14. *Solanum palitans* Morton, Revision Argentine species of *Solanum* (1976) 92.**

Type citation: "Venturi 159, collected on road to Yerba Buena, Departmental Capital, Province of Tucuman, Argentine, 470 m.s.m., Jan. 19, 1919".

Holotype: US No. 1548805. *Isotypes*: BA, LIL, SI, LP. None seen; photo of type in Morton (1976:95).

Literature

Beadle et al. (1972) 487, as *S. radicans*; Morton l.c.

A vigorous sprawling annual or perennial *herb* to at least 50 cm long, sometimes to 1-2 m, frequently rooting at nodes; stems slender, scarcely woody, apparently angular in section when dried, almost glabrous or with simple uniseriate, multicellular hairs especially in leaf axils, vesicular glands also present. *Leaves* 3-5 x 1-3 cm, ovate, deeply palmate into 3 leaflet-like lobes; lobes elliptic-obovate, with small glandular hairs especially along veins below, glabrescent above; leaf margin and petiole sparsely ciliate

with simple, glandular, or multicellular hairs. *Inflorescence* a raceme of 4-10 white flowers opposite the leaf axils, sparsely pubescent with appressed hairs; peduncle c. 1 cm long; floral rhachis 1 cm long; pedicel 5 mm long. *Calyx* 2-3 mm long; lobes 1 mm long, acute. *Corolla* 1 cm or less diam., stellate, white, lobes acute and pubescent on their tips outside. *Filaments* (Fig. 159) 1 mm long, pilose; anthers 1.5 mm long, oblong, not coherent. *Ovary* glabrous; style 4 mm long, shortly glandular-pubescent in lower part, protruding c. 1 mm beyond anthers; stigma capitate, greenish. *Fruit* (Fig. 148) 4-5 mm



Fig. 12. *Solanum palitans* Morton. Drawn from field grown plant at the Waite Institute, from seed from *Salasoo* 3061, collected about 3 km north-west of Bullio and about 32 km north-west of Bowral, NSW (ADW 39725). $\times 2/3$.

diam, apparently 2-celled, dull yellowish-green; peduncle, pedicel and calyx all somewhat enlarged at maturity. *Seeds* (20-) 45 (-60) per fruit, about 1-1.5 mm long, pale buff in colour, with 2-5 stone cells per fruit. (Fig. 12.)

Chromosome number: $n = 12$ Randell & Symon (1976) (as *S. radicans*).

Notes

The placement of this species under section *Dulcamara* is not very satisfactory but in the absence of adequate revision of South American subgeneric groupings it is difficult to place it with confidence. I have no other record of this species as a weed. It is not eaten by stock.

Distribution and habitat (Map 6)

At present confined to central coastal N.S.W.

Selected specimens (total seen about 20)

NEW SOUTH WALES: *Bayer s.n.*, Jan. 1911, West Maitland (ADW, NSW); *Sturgess s.n.*, 6.xii.1948, Musselbrook (K, NSW); *Constable 6738*, 23.ii.1966, Burragorang Lookout (ADW, NSW).

*15. *Solanum triflorum* Nutt., Gen. Nth Amer. Pl. 1 (1818) 128.

Type citation: "As a weed in and about the gardens of the Mandans and Minitarees, and in no other situation near Fort Mandan". The localities are in North Dakota, U.S.A.

Type material: Not seen, possibly BM.

Literature

Don (1837) 407; Walpers (1844) 31; Dunal in DC. (1852) 45; Hamilton (1916a) 275; Pammel (1921) 43; Ewart (1931) 1003; Myers (1941) 456; Borza (1942) 17-20; Hurst (1942) 376; Waller (1944) 80; Van Ooststroom (1959) 153-154; Beadle, Evans & Carolin (1962) 401; Ooststroom (1966) 90-91; Ooststroom & Reichgelt (1966) 162; Ooststroom (1968) 108; Burbidge & Gray (1970) 322; Willis (1972) 550; Beadle, Evans & Carolin (1972) 487; Everist (1974) 480; Morton (1976) 96 under *S. calophyllum*.

Common names: cutleaf nightshade, three flowered nightshade.

A sprawling annual *herb*, stems 15-100 cm long, sometimes rooting at nodes, unarmed, sparingly pubescent, with coarse, simple hairs of 4-6 cells, often flattening on drying. *Leaves* 2-3 x 1-2 cm, ovate or elliptic, shallowly or deeply lobed or toothed, 7-9 main lobes when deeply cut, themselves lobed; leaf margins somewhat recurved, thickened, prominent below when dry. *Inflorescence* 3-flowered, subumbellate cyme, in an extra-axillary position, bearing a small terminal leaflet; peduncle 1-2 cm long, firm, straight; pedicel c. 3-4 mm long. *Calyx* tube 1-1.5 mm long; lobes 2 mm long, lanceolate to long-triangular. *Corolla* stellate, 5-6 mm diam., white; tube 1.5 mm long; lobes 2.5 mm long; apices pubescent. *Filaments* (Fig. 159) 0.5 mm long, sparsely pubescent; anthers 2.5 mm long, oblong. *Ovary* 1.5 mm diam., glabrous; style 3 mm long, sigmoid, minutely pubescent in lower half; stigma capitate, at level of anther pores. Fruiting pedicels 8 mm long, recurved, slightly thickened below fruit; calyx well developed but not enclosing fruit, reflexed at maturity, lobes acuminate; *fruit* (Fig. 148) c. 1 cm diam., globular, marbled whitish-green (close to RHS Spinach Green 0960), succulent. *Seeds* (100-) 124 (-142) per berry; mature cleaned seed 1.5-2 mm long, light brownish yellow, under some conditions appearing pubescent; stone cells abundant, (22-) 28 (-35), visible in ripe fruit, spherical, 1 mm diam. (Fig. 13).

Chromosome number: $n = 12$ Randell & Symon (1976).

Notes

S. triflorum was first collected in Australia near Cooma in 1916. The section to which it belongs is not yet ascertained as it has many differences from the more typical members of section *Solanum*. It has variously been described as "ill smelling", "sickly sweet odour"

and "sweet scented" and is apparently untouched by stock. It has some slight reputation as a poisonous plant.

Ooststroom (1966) described the variety *dentatum* which differs from the typical variety in having shallowly lobed or almost entire leaves with 2-4 teeth on each margin. The variety was recorded by him from the Netherlands and from Britain. However, this variant was described earlier by Prodan (1938) as *Solanum ponticum* and it was reduced to varietal rank by Borza (1942). If it is retained as a distinct taxon the correct name



Fig. 13. *Solanum triflorum* Nutt. Drawn from a pot grown plant at the Waite Institute, from seed from S. Whissen, collected 8 km on Coorong side of Tintinara, SA (ADW 40790). $\times 2/3$.

would seem to be *Solanum triflorum* var. *ponticum* (Prodan) Borza. The leaf of a plant closely approaching this variety is illustrated in Black (1956) and was drawn from a plant collected at Kanmantoo, S.A. (ADW 10553). Two N.S.W. collections—Shelley, 1953, from Temora, and Stenning, 1947, from Narromine—also belong to this broad-leaved variant.

Distribution and habitat (Map 3)

Originally from North America *S. triflorum* has become naturalised in mainly cool temperate areas of all States, except N.T.

Selected specimens (total seen about 70)

WESTERN AUSTRALIA: *Kemble s.n.*, 5.ii.1946, Badgebup (PERTH); *Moir s.n.*, Jan. 1968, Midland (ADW, PERTH).

QUEENSLAND: *Alison s.n.*, 24.ii.1954, Stanthorpe (BRI); *Taylor s.n.*, 22.xii.1958, Wallangara (BRI).

NEW SOUTH WALES: *Weston s.n.*, Jan. 1922, Canberra (NSW); *Symon 9807*, 30.i.1975, Finley (ADW, NSW, MO).

VICTORIA: *Rogers s.n.*, Feb. 1922, Black Mountain, 83 km E of Bairnsdale (MEL); *Muir 2789*, 24.ii.1963, Doctors Flat, Tambo River (MEL).

SOUTH AUSTRALIA: *Agric. Bur. s.n.*, 9.iv.1942, Tintinara (ADW); *Whissen s.n.*, 20.iv.1967, 8 km W of Tintinara (ADW, BIRM, CANB, DAV, K, NSW).

Section 5. *Jasminosolanum* Bitt. ex Seithe, Bot. Jahrb. Syst. 81 (1962) 291.

Type species: S. jasminoides Paxt.

The species of this section are climbers or lianas. They are unarmed, glabrate or pubescent with simple or branched hairs. The leaves are entire or imparipinnate or pinnatisect on the same plant, minor leaves may be present, and the petioles twining. The inflorescence is at first terminal becoming lateral, several- to many-flowered, and paniculate. The corolla is stellate to broadly stellate, showy; the anthers stout, oblong, opening by terminal pores and lateral slits. The fruit is succulent, globose, bright red to purple-black.

The centre of speciation of this small section is in Central and South America. A few species are widely cultivated and naturalised.

*16. *Solanum jasminoides* Paxt., Paxton's Mag. Bot. 8 (1841) t. 5.

Type collection: From cultivated material possibly collected by Tweedie from Rio Grande do Sul, see Harley (1970).

Lectotype: The plate indicated above.

Solanum dietrichiae Domin, Biblioth. Bot. 89 (1929) 1130.

Type citation: "Queensland: *A. Dietrich* No. 2789".

Holotype: PR 530859, photo ADW, this specimen bears the label: "Prope Brisbane river Australiae or. legit Amalia Dietrich 2789, 1863-1865". It agrees very well with *Solanum jasminoides* ADW 25040.

Literature

Dunal in DC. (1852) 82; Sendtner in Martius (1856) 48, as *boerhaviaefolium*; Darwin (1867) 41; Hamilton (1896) 763; Hassler (1918a) 119; Standley (1924) 1293; Vilmorin & Simonet (1927) 164; Burkill (1935) 2043; Cheel (1911) 158; Bor & Raizada (1942) 122-128; Hurst (1942) 370; Ratera (1943) 6; Webb (1948) 158; McBride (1962) 182; Cabrera (1965) 207; Smith & Downs (1966) 64 as *boerhaviaefolium*; Krishnappa (1968) 163-173; Madhavadian (1968) 343; Harley (1970) t. 568; Beadle et al (1972) 487; Morton (1976) 64; Jain & Sharma (1977) 233.

Common name: potato climber, jasmine nightshade.

A many stemmed vigorous perennial climber, glabrous but for tufts of simple, 2-5-celled hairs in the leaf axils and in axils of veins on the lower side of leaves, prickles absent.

Juvenile *leaves* to 7 x 6 cm, ovate, deeply divided into 3-5 lanceolate lobes, lower pair of leaflets often petiolulate, second pair broadly attached; mature leaves about 4 x 2 cm, usually simple, ovate to ovate-lanceolate, sometimes with two smaller leaves 1-1.5 x 0.6 cm in the axils; petiole 1-2 cm, straight or strongly curved and twining. *Inflorescence* at first terminal, later lateral, a leaf-opposed dichotomous panicle of about 20 white or pale blue flowers; pedicels 1-1.5 cm long, slender. *Calyx* 2-3 mm long; lobes 1-1.5 mm long, acuminate, with a few hairs on their tips. *Corolla* 2 cm diam., stellate, glabrous within, slightly pubescent along margins outside; lobes 7-8 mm long, acute. *Filaments*



Fig. 14. *Solanum jasminoides* Paxt. Drawn from garden grown plant at Tusmore, SA (ADW 42140). $\times \frac{2}{3}$.

(Fig. 159) 2 mm long, flattened, pubescent; anthers 2-3 mm long, oblong. *Ovary* 1-2 mm long, conical, glabrous; style 5 mm long, densely pubescent; stigma glabrous. *Fruits* (Fig. 148) sparsely produced in loose panicles, 7-9 mm diam., globular to slightly ovate, at first green then dark blue and finally shiny black, succulent, the flesh and juice dark purple; pedicels 15 mm long, distinctly swollen apically to 3-4 mm diam.; calyx lobes appressed, scarcely enlarged, lobes 1-2 mm long, rounded. *Seeds* 2-3 mm long, grey with a distinctly paler margin. (Fig. 14).

Chromosome number: $n = 12$ Randell & Symon (1976).

Notes

S. jasminoides is normally propagated by cuttings and the plants grow with the simple or only sparsely lobed adult leaves. However, plants from root cuttings show, at least in the early stages, the more deeply lobed juvenile leaves. In the specimens listed below it will be noted that the two A. Dietrich specimens have the same collection number but different localities.

Distribution

Native to South America and sparingly naturalised in Qld and N.S.W. It is also widely grown as an ornamental climber in other States.

Selected specimens (total seen about 10)

QUEENSLAND: Dietrich 2789, 1863-65, Brisbane River (PR).

NEW SOUTH WALES: Dietrich 2789, 1863-65, cultivated Port Jackson (MEL); Judd s.n., 1954, Minnamurra Reserve naturalised (NSW).

SOUTH AUSTRALIA: Symon s.n., 20.xi.1961, cultivated Blakiston (ADW).

*17. *Solanum seaforthianum* Andr., Bot. Repos. 8 (1808) t. 504.

Type citation: Cultivated in Britain from material "introduced by Lord Seaforth from the West Indies The specimen which our figure represents was sent to us in fine bloom by Mr. J. Milne, botanic gardener".

Type material: No herbarium specimens of H.C. Andrews are known to exist. The plate indicated above is proposed as iconotype.

Literature

Poiret (1814) 747; Dunal (1816) 7; Don (1837) 407; Walpers (1844) 40; Dunal in DC. (1852) 67; White (1917a) 270; Tryon (1918) 141; White (1923) 238; Standley (1924) 1294; Burkill (1935) 2046; White (1935) 416; White (1937) 225; Small (1934) 59, t. 606; Standley & Morton (1938) 1093; White (1938a) 117; Francis (1939a) 465; Bor & Raizada (1942) 122; Hurst (1942) 374; White (1946) 273; Webb (1948) 159; Webb (1949) 50; Webb (1952) 94; McBride (1962) 188; Heine (1963) 332; Backer & Bakhuizen (1965) 470; Krishnappa (1968) 163; Madhavadian (1968) 343; D'Arcy (1973) 758; D'Arcy (1974) 859; Gentry & Standley (1974) 136; Everist (1974) 467; Heine (1976) 143; Morton (1976) 59.

Common name: Brazilian nightshade.

A sprawling perennial *shrub* or *climber* with slender stems, unarmed. Glabrous except for simple, few-celled hairs along leaf edges, on veins below and on corolla margins and tips, and few, short, glandular hairs on the peduncle and pedicels. *Leaves* to 13 x 11 cm, usually less, c. 5-8 cm long, ovate, partially or completely pinnately parted to midrib into 3-9 lobes, lowest lobe often smaller, other lobes 4 x 1.5 cm, oblanceolate, shortly petiolate or broadly attached, sinuses rounded or acute; petiole 2-4 cm long. *Inflorescence* a showy panicle to 10 cm long, few to 50 mauve-blue flowers, at first terminal, soon becoming lateral by growth of axillary bud; pedicel 1 cm long, slender, slightly thickened towards calyx, sparsely glandular-pubescent. *Calyx* tube 1-2 cm long, almost entire, lobes very short and obtuse, tipped with a few hairs. *Corolla* 2-3 cm diam., stellate, deeply divided, tube 2-3 mm long; lobes 15 x 5 mm long, acute, margins and tips slightly pubescent.

Filaments (Fig. 159) 2-4 mm long; anthers 4 mm long, oblong, stout, slightly unequal. *Ovary* glabrous or with few glandular hairs; style 7-8 mm long. *Fruit* (Fig. 148) c. 1 cm diam., globular, bright shiny red, close to RHS Orient Red 819, finally pulpy. *Seeds* 2-3 mm across, reddish brown, shaggy hairy, (23-) 26 (-30) per berry. (Fig. 15.)

Chromosome number: $n = 12$ Fedorov (1969).



Fig. 15. *Solanum seaforthianum* Andr. Drawn from a garden grown plant at Tusmore, SA, from seed from Brisbane Botanic Gardens, Qld (ADW 32938). $\times 2/3$.

Note

This ornamental climber has been widely grown as a garden plant for its showy flowers and brilliant fruits, which are toxic, at least to poultry (Tryon, 1918:141).

Distribution and habitat (Map 15a)

Originally it came from the West Indies but is now widely cultivated and established in South America and other tropical areas. In Australia it is occasionally cultivated in the southern States and is naturalised in the tropical scrubs of Qld and N.S.W.

Selected specimens (total seen about 50)

QUEENSLAND: *Kenny s.n.*, 1904, Gympie (BRI); *Symon 4754*, 17.v.1967, Tolga scrub (ADW, B, CANB, K).
NEW SOUTH WALES: *Davis s.n.*, Apl. 1953, Fingal (NSW); *McKee 9544*, 28.vii.1962, Cudgen (BRI, CANB, NSW).

Section 6. *Aculeigerum* Seithe, Bot. Jahrb. Syst. 81 (1962) 291-292.*Type species: S. wendlandii* Hook. f.

The species in this section are climbers or lianas. They are armed with inconspicuous hooked prickles, the plants are glabrescent or with minute simple hairs. The leaves are simple, deeply lobed or pinnate on the same plant, and relatively large. The inflorescence (in our species) is a large showy panicle at first terminal, later lateral, with a large rotate corolla, anthers unequal, long-oblong, and scarcely tapered, opening by terminal pores, and with the ovary, style and stigma vestigial in our clone.

The centre of speciation of this small section is in tropical America with one species widely cultivated as an ornamental. The section has unusual combinations of characters and its placement in the genus is controversial.

*18. *Solanum wendlandii* Hook. f. in Curtis's Bot. Mag. 113 (1887) t. 6914.

Type citation: Grown at Kew from plants from Dr Wendland, Hanover, originally from Costa Rica.

Type material: K, photo ADW.

Literature

Hassler (1918) 239; Shirley & Lambert (1918) 601; Burkill (1935) 2049; Standley & Morton (1938) 1098; Bor & Raizada (1942) 122-128; Hurst (1942) 377; Webb (1948) 160; Lawrence (1960) 34; Backer & Bakhuizen (1965) 470; Smith & Downs (1966) 139; Chennaveeraiah & Krishnappa (1968) 149-154; Madharadian (1968) 343; D'Arcy (1973) 685; D'Arcy (1974) 863; Gentry & Standley (1974) 143; Heine (1976) 144.

Common name: potato vine, Costa Rica nightshade.

A vigorous, coarse climber, glabrous except for a few hairs on corolla tips, sometimes a few hooked prickles on main stems or leaves. *Leaves* large, variable, to 11 x 8 cm in specimens seen, (reported twice that size), oval, pinnately divided into 3-7 lobes, lowest pair may be petiolulate, or lobing reduced and leaves then appearing simple and elliptical-oval, sinuses rounded when present, leaf margins smooth, leaf tip acuminate. *Inflorescence* a showy terminal panicle of cymes, the whole to 20 cm long, individual cymes about 15 cm long; pedicels 1.5 cm long, slender. *Calyx* campanulate, tube 2-3 mm long; lobes 2-3 mm long, oblong, cuspidate. *Corolla* 3-5 cm diam., pale lilac-blue, pentagonal-rotate, shallowly lobed, lobe tips acuminate. *Filaments* (Fig. 159) unequal, two 3-4 mm long, and three 1-2 mm long; anthers 1 cm long, oblong.

Plants in cultivation appear to have male flowers only and descriptions of the fruit are rare and contradictory. Standley & Morton (1938) describe the fruit as large as an apple. Gentry (1974) describes them as edible, ovoid, yellowish, 3.5-4 cm in diam. and Dr L.D. Gomez, Director of the Herbario Nacional, Costa Rica has kindly sent me the following descriptions of the fruits and seeds.

"The berries are small 10-15 mm in diameter, clustered at the ends of somewhat elongated branches. They are long pedunculate, peduncle 20-35 mm long, 1-1.2 mm thick. At first dark 'bottle-green' slowly turning red at maturity. The seeds are small, slight reniform, complanate, 1.5-2 mm long, 1 mm wide, greenish white when dried. On sowing few germinate and propagation of this beautiful species is done mostly by cuttings". (Fig. 16.)



Fig. 16. *Solanum wendlandii* Hook. f. Drawn from garden grown plant at Tusmore, SA (ADW 42151). $\times \frac{2}{3}$.

Chromosome number: $n = 12$ Fedorov (1969).

Notes

A native of Costa Rica, widely grown in gardens in Australia as a decorative climber. It is not clear in the Qld specimen cited below, whether the species was naturalised or planted.

Distribution

Only known in cultivation in warm temperature and tropical areas.

Selected specimens

QUEENSLAND: *Clemens s.n.*, March 1947, Mt Tambourine, Moreton District, covering a great stump in bush dairy (K).

SOUTH AUSTRALIA: *Symon 9901*, 10.iv.1975, cultivated Beaumont (ADW, CANB, MO).

Section 7. *Lycianthes* (Dunal) Wettst. in Engl. & Prantl. Nat. Pflanzenf. 4 (1895) 22.

Lectotype species: *S. lycioides* L.

Taxonomists are not yet agreed on the status of this section. Morton (1944 and posthumously, 1976), McBride (1962), Smith & Downs (1966) continue to maintain species of this alliance as members of the genus *Solanum*. Others, such as Bitter (1920), Seithe (1962), D'Arcy (1973, 1974), Gentry & Standley (1974), have maintained the genus *Lycianthes*. Although there have been several partial treatments in recent times no comprehensive revision has been done since the pioneer account by Bitter (1920). The Asian species in particular are poorly known. It is widespread in its distribution, occurring in S.E. Asia (abundant in Papua New Guinea) and Central and South America. Two recent collections, at present unidentified, one of leaves only, the second with some fruits, suggest it may be present in some of the northerly islands of the Great Barrier Reef. More and better collections are needed. The species comprise herbs, shrubs and vines, unarmed and with tomentum of simple or branched hairs. The leaves are entire or nearly so and are often geminate. The most consistent difference between *Lycianthes* s. str. and *Solanum* s. str. is the presence of a 10-ribbed truncate calyx on which secondary teeth or lobes may develop giving a 10-lobed effect. In the absence of extensive collections of *Lycianthes* s. str. here and holding a broad concept of the genus *Solanum*, I have retained the single example in *Solanum*.

*19. *Solanum rantonnei* Carrière, Rev. Hort. (1859) 135, t. 32.

Type citation: Not seen.

Type material: Not seen, for discussion on the spelling of this name see D'Arcy (1974).

Literature

Hassler (1918) 219; Bitter (1920) 298-299; Bitter (1923) 309; Bor & Raizada (1942) 1; Morton (1944) 63; Lawrence (1960) 34; McBride (1962) 240; Smith & Downs (1966) 128; D'Arcy (1974) 864 (as *Lycianthes*); Morton (1976) 36.

Common name: blue potato bush

A tall arching or sprawling *shrub* 2-3 m high, stems slightly angular, sparsely striate, glabrous or with simple or branched hairs principally on under surface of the leaves, unarmed. *Leaves* sometimes geminate, variable, a few centimetres long on small twigs, to 10 x 5 cm on leading shoots, elliptic, tip acute or acuminate; base cuneate; petiole slender, 0.5-1.5 cm long, blade cuneate along the upper part. *Inflorescence* a subumbellate cluster of 2-5 bright blue flowers from leaf axils, flowers slightly zygomorphic; pedicels 1.5-2.5 cm long, slender. *Calyx* tube 2 mm long; lobes 2 mm long, linear, usually 5 well developed, a second whorl of smaller, shorter lobes sometimes developed between main

ones. *Corolla* 2-3 cm diam., rotate, the three upper lobes with a yellow patch at base of the main veins; lobes scarcely distinguishable, with a small pubescent acumen. *Filaments* (Fig. 161) unequal, upper two slightly shorter than lower three, 1-2 mm long, glabrous; anthers unequal, upper pair slightly smaller, c. 3 mm long, oblong. *Ovary* glabrous; style 4-6 mm long, glabrous, turned upwards and outwards, projecting through the anther cluster. *Fruit* not seen but reported by Morton (1976) to be "yellow, subglobose-ellipsoid with a cordate base, very large 2.75-3 cm long, 2.5-2.75 cm in diam. *Seeds* dark brown, reniform, flattened c. 2.5 mm long and 2 mm wide; stone grains very numerous, more



Fig. 17. *Solanum rantonnei* Carrière. Drawn from garden grown plant at Tusmore, SA (ADW 45436). $\times \frac{2}{3}$.

than 15, large, c. 1.5 mm diam." Fruits produced in Adelaide are quite small and contain a few sclerotic granules but no seeds. (Fig. 17.)

Chromosome number: $n = 24$ Fedorov (1969).

Notes

The identification of this species is not satisfactory, plants commonly grown in Adelaide differing in a number of ways from the description of *S. rantonnei* given in McBride (1962). The pedicels are not stipitate-glandular, filaments are not pubescent below, calyx teeth are smaller, leaves rarely as large, and it differs from *S. lycioides* L. in the branches not being spine-tipped and trichomes branched rather than stellate. The plant was first described as a species of *Solanum* and was later placed in the genus *Lycianthes* by Bitter (1919). Subsequent authors have placed it in both *Solanum* and *Lycianthes* and it is here maintained in the former genus largely for convenience until a contemporary account of *Lycianthes* is available. I have not seen fruits develop on local material.

Distribution and habitat

Originally from South America now cultivated as an ornamental in gardens, not known to be naturalised.

Selected specimen

SOUTH AUSTRALIA: Symon s.n., 14.xii.1974, Tusmore (ADW, BRI, CANB).

Section 8. *Archaesolanum* (Bitt. ex Marzell) Danert, Die Kulturpfl. 18 (1970) 267, 268. *Archaesolanum* Bitt. ex Marzell in Hegi, Fl. Mittel-Europa 5 (1927) 2583; basionym (as a subgenus).

Type species: *S. aviculare* Forst.

Short-lived, soft-wooded *shrubs*, 0.5-2 (-4) m tall, lasting a few years, straggly with age, basal stems to 10 cm diam., not reproducing vegetatively. Glabrous except for minute simple or glandular hairs in apical positions on seedlings, young growth, calyx and corolla tips, and for occasional quite large, stout, coarse hairs on the lower midrib of some of the juvenile leaves; all species are unarmed. *Leaves* very variable, juvenile leaves deeply 4-6-lobed (shallow in *S. simile*, *S. capsiciforme*), often large, 15-30 cm long, adult leaves usually lanceolate, entire, smaller. *Flowers* in large or small scorpioid cymes, often in forks of branches, rarely solitary; calyces campanulate, lobes short; corolla 1.5-4 (-5) cm diam., rotate or rotate-stellate, purple or reddish or bluish-violet, rarely white, often showy; *filaments* 2-5 mm long, glabrous; anthers free, relatively short, oblong, loosely erect. *Fruit* globular or ovoid (conical in *S. capsiciforme*), at maturity green or suffused ivory or purple, yellow, orange to scarlet, succulent, sometimes aromatic; stone cell concretions present in all species, often conspicuous and numerous. *Seeds* 1.5-3 mm diam., fewest in *S. simile* and *S. capsiciforme* (about 100 per fruit) to more than 600 in *S. aviculare*.

All species contain the alkaloids solasodine and solomargine in both leaves and fruits, Lewis & Liljegren (1970), Bradley et al. (1978), Mann (1979).

Chromosome number: $n = 23$, unique in the genus, diploids and tetraploids occur.

Distribution and habitat

New Zealand, New Guinea, down the east coast of Australia from Qld to Tas. and along the southern coast to W.A. The plants are generally in disturbed or open sites, coastal dunes, creeklines, roadsides, forest clearings and tracks, and often in mesic environments.

Notes

The section *Archaesolanum* is distinctive within the genus *Solanum*. Despite the

name, the group must be a derived one although no ancestral species have been proposed, nor have possible ancestral species with chromosome numbers of $n = 12$ or $n = 24$ been found.

Most of the species in the section are closely related morphologically and are often difficult to distinguish on herbarium sheets; *S. capsiciforme* is the most distinctive. Whether the group deserves generic rank is debatable. A very broad concept of *Solanum* has long been accepted, perhaps partly engendered by its very size (cf. *Senecio* in the Asteraceae), the uniformity of floral structure and the difficulty for a single taxonomist (particularly one with regional collections only, to comprehend fully the overall specific variability. Davis & Heywood (1963) caution against generic splitting in the absence of monographic revision. There has been no suggestion in the recent monographs by Correll (1962), and Hawkes (1956, 1963) that the tuber-bearing sections be raised to generic rank. Nor is it discussed by Baylis (1954, 1963) and Gerasimenko (1965, 1968, 1969) in their studies on *Archaesolanum*. However, several groups of species have at times been separated and maintained as genera, e.g. *Androcera*, *Bassovia*, *Lycianthes*, *Cyphomandra*, though Seithe (1962) considers these at least in part as subgenera of *Solanum*.

A comparison of *Archaesolanum* with *Lycopersicon* (tomato) is relevant, the latter being a morphologically distinct group of relatively few species. It can be separated from *Solanum* s.l. on a few technical details e.g. prolonged sterile anther tips, 'interlocking' hairs holding the anthers in a cone, and anther dehiscence. Crosses with two other species until recently accepted as *Solanum*, viz. *S. pennellii* and *S. lycopersicoides*, have been made, thus indicating a close relationship between *Lycopersicon* and these species. However, it has been convenient, for horticultural reasons, to maintain *Lycopersicon* as a genus rather than sink it in a welter of *Solanum* names. Seithe (1962) maintains it at sub-generic rank and Danert (1970) as a section. The group of species exemplified by *S. rostratum* is no less distinct and was given generic status as *Androcera* by Nuttall (1818), but is now usually included in *Solanum*, as section *Androcera* by Seithe (1962) and as section *Cryptocarpum* by Danert (1970). The present broad concept of *Solanum* would collapse if these and other small, weakly separated groups were given generic status. The problems of infra-generic taxa are made more difficult by the very uneven state of knowledge of the genus. The commercially important species e.g. section *Potatoe* Walp. [*Tuberarium* (Dunal) Bitt.] and *Lycopersicon* have been intensively studied, but the very large number of stellate-haired species are as yet not well known and still wait for a contemporary monographer.

Two species of the section *Archaesolanum*, viz. *S. aviculare* and *S. laciniatum*, have been cultivated sporadically in European and Australian gardens for many years, Stapf (1928). In recent years there has been considerable interest in the group mainly in the U.S.S.R., eastern Europe and New Zealand as a source of alkaloids and many papers on the agronomy of the crop have now been published (Mann, 1979).

The following series have been recognised by Gerasimenko. The series do group species that appear related and it is possible that the tetraploids *S. laciniatum* and *S. symonii* are derived from their associated diploids although this has not yet been demonstrated cytologically.

Series 1. *Avicularia* Gerasimenko, Nov. Syst. Pl. Vasc. Leningrad 7 (1970) 270.

Leaves long-acuminate; calyx lobes obtuse; corolla stellate; the lobes keeled, fimbriate; seeds 7-20 times as numerous as the stone-cell granules.

- 20. *S. aviculare* Forst. f. (incl. *S. brisbanense* (Gerasimenko) Gerasimenko)
- 20a. *S. cheesemanii* Gerasimenko
- 20b. *S. baylisii* Gerasimenko

Series 2. *Laciniata* Gerasimenko, loc. cit. 273

Leaves short acuminate; corolla rotate; the lobes short, emarginate; stone-cell granules less than one fifth the number of seeds.

21. *S. laciniatum* Ait.
22. *S. linearifolium* Gerasimenko ex Symon
23. *S. vescum* F. Muell.

Series 3. *Similia* Gerasimenko, loc. cit. 274

Leaves obtuse or blunt; corolla rotate; the lobes short, emarginate; stone cell granules as many as the seeds.

24. *S. simile* F. Muell.
25. *S. symonii* Hj. Eichl.
26. *S. capsiciforme* (Domin) Baylis

20. *Solanum aviculare* Forst. f., Pl. Esc. (1786) 42, No. 12.

Type citation: “Nova Zeelandia”, the specimen was collected from New Zealand during Cook’s second voyage.

Lectotype: BM, “107 *Solanum aviculare*—G. Forster’s Herbarium” Queen Charlotte Sound, New Zealand, proposed by Baylis (1954).

Solanum glaberrimum Dunal ex Poir., Encyc. Meth. Bot. Suppl. 3 (1814) 747.

Type citation: “Elle a été apportée de Timor (Dunal)”.

Type specimen: Not seen.

S. brisbanense (Gerasimenko) Gerasimenko, Nov. Syst. Pl. Vasc. Leningrad 7 (1970) 273.

S. aviculare Forst. f. var. *brisbanense* Gerasimenko, Bjull. Glavn. Bot. Sada. 59 (1965) 72-73, *basionym*.

Type citation: Described from plants grown near Moscow from seed from Brisbane.

Holotype: Not stated, may be at LE, not seen.

Literature

There has been confusion in the identification of *S. aviculare* and *S. laciniatum* and the literature should be viewed with caution.

Dunal (1813) 238; Dunal (1816) 48; Don (1837) 441; Walpers (1844) 95; Dunal in DC. (1852) 69; Miquel (1857) 640; Hooker (1860) 287-288; Hooker (1864) 200; Bentham (1868) 447; Mueller (1868) 144; Bailey & Tenison-Woods (1879-80) 171-172; Mueller (1882) 96; Bailey (1883) 342; Hamilton (1887) 289; Haviland (1887) 106; Woolls (1887) 11; Mueller (1888) 361; Maiden (1889a) 543-545; Tate (1890) 144; Moore (1893) 332; Maiden (1898a) 150; Hamilton (1899) 363; Maiden (1899a) 48; Bailey (1901) 1080; Barwick (1902) 941; Rodway (1903) 137; Bailey (1906) 119; Cheeseman (1906) 481; Dixon (1906) 221; Turner (1908) 378; Cambage (1906) 445; Maiden (1909) 1012; Bailey (1912) 199; Bailey (1913) 354; Maiden & Betche (1916) 181; Hamilton (1916) 171; Hamilton (1917) 287; White (1918) 151; White (1920) 29; Brough *et al.* (1924) 487; Chisholm (1925) 294, 297; Domin (1928) 1127; Daley (1931) 23-31; Ewart (1931) 1003; White (1933) 158; White (1937) 511, 740; Bell & Briggs (1942) 1-2; Connor (1951) 94; Baylis (1954) 639-643; Irvine (1957) 113-142; Gerasimenko & Kibalchich (1959) 1494; Lawrence (1960) 28; Allan (1961) 834; Stary & Storchova-Burianova (1962) 245-248; Baylis (1963) 168; Foldesi (1965) 61; Gerasimenko (1965) 71; Gerasimenko & Reznikova (1965) 74; Baylis (1966) 283; Baylis (1968) 221; Gerasimenko & Reznikova (1968) 505; Gerasimenko (1969) 51; Kondratenko & Kibalchich (1969) 11; Gerasimenko (1970) 270; Beadle, Evans & Carolin (1972) 487; Korneva *et al.* (1972); Willis (1972) 549; Korneva (1970-73) 1568 (not seen); Korneva & Balckhonova (1973) 47; Everist (1974) 463.

Common name: kangaroo apple.

An erect, soft-wooded *shrub*, (1-) 2 (-4) m tall, lasting several years, becoming woody towards base, straggly with age, not clonal, stem angular with raised lines; all parts glabrous except for minute simple and glandular hairs on young growing points and corolla tips, unarmed, general aspect green. Lobed *leaves* 15-30 cm x 10-15 cm, broadly elliptic to obovate, with 3-11 lobes, sinuses rounded, cut to within 1 cm of midvein; lobes 1-10 x 1-2 cm, lanceolate or long triangular, leaf and lobe apex acute to acuminate.

Entire leaves (8-) 10 (-25) x (1-) 2 (-3.5) cm, lanceolate-elliptic, apex mostly acute to acuminate; base cuneate, oblique; petiole 1-1.5 cm long, usually distinct and unwinged to base. *Inflorescence* a scorpioid cyme of few to 10 flowers, from stem fork or leaf axil, often forked at base with a pedicellate flower in fork, cyme rarely forked a second time; common peduncle usually lacking, floral rhachis to 15 cm long; pedicel 1.5-2 cm long. *Calyx* campanulate, 3-4 mm long, lobes bluntly triangular; acumens short, blunt. *Corolla* 3-4 cm diam., rotate-stellate, lobes broad, interacuminal tissue slightly exceeding acumen, shallowly campanulate and often facing downwards, bluish-violet (close to RHS

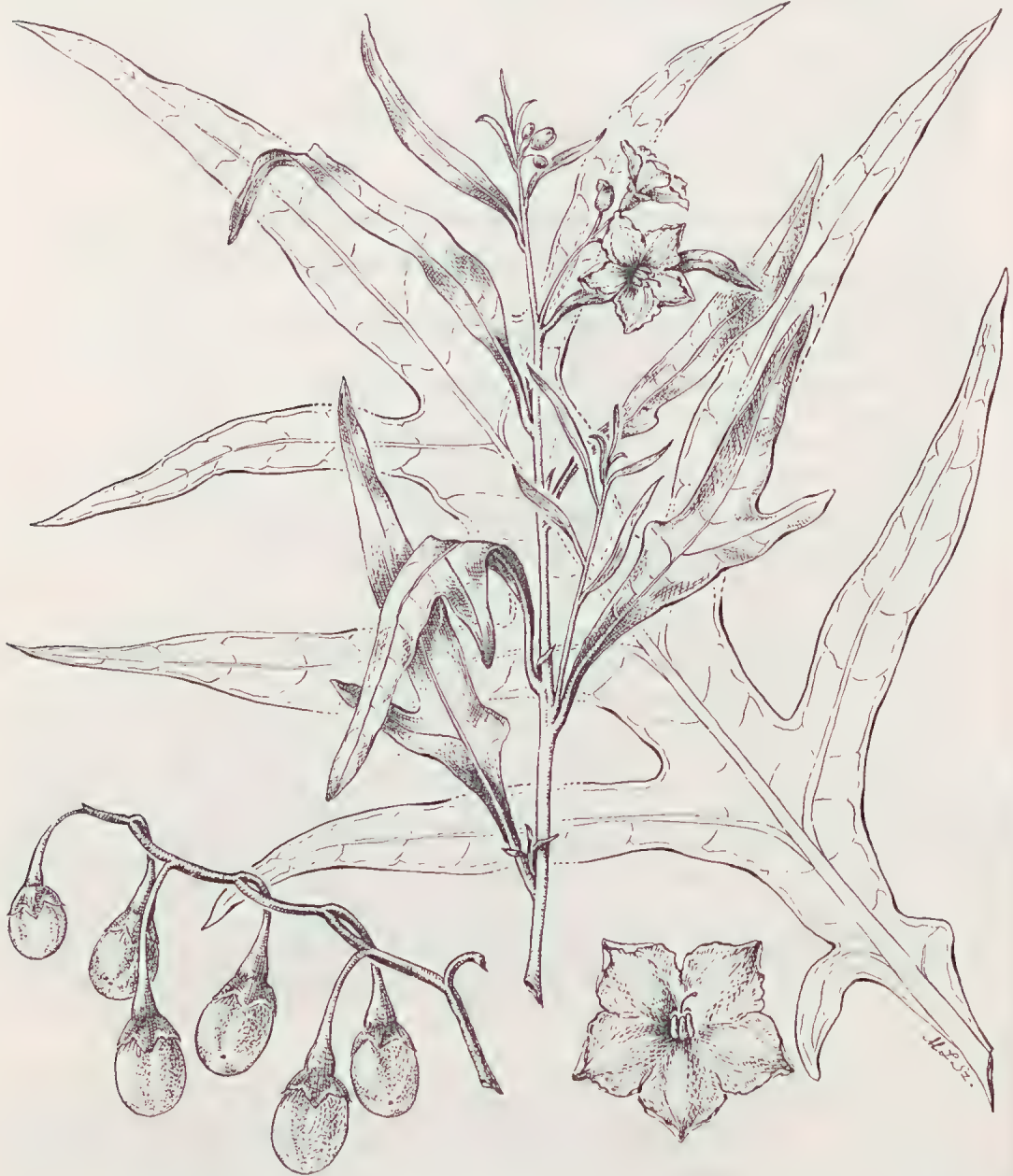


Fig. 18. *Solanum aviculare* Forst. f. Drawn from pot grown plant from seed from Adelaide Botanic Garden (ADW 40818). $\times \frac{2}{3}$.

Lavender Violet 637/1 & 2) with a deeper violet star. *Filaments* (Fig. 160) 3 mm long, thick; anthers 4 mm long, oblong, firmly erect. *Ovary* glabrous; style 7-8 mm long, slightly sigmoid, pale, erect, glabrous; stigma terminal, pale or green. *Fruits* (Fig. 149) 2 x 1-1.5 cm, obovoid to ellipsoid, at maturity bright orange-red to scarlet, succulent. *Seeds* 1.5 mm long, finely reticulate, light or reddish-brown. Stone cell masses 1-1.5 mm long, rarely more, rounded, rarely faceted, not conspicuous. Seed counts on 10 berries (388-) 690 (-845) seeds, (29-) 40 (-53) stone cell masses. *Cotyledons* c. 10 x 5 mm, ovate, acute, almost glabrous, hypocotyl and petiole with simple hairs, first true leaf 15 x 12 mm with a few sparse hairs. (Fig. 18.)

Chromosome number: $n = 23$ Baylis (1954).

Note

The following varietal names have been published but as no nomenclatural types were indicated they are invalid (Art. 37, ICBN). I have not traced later validation of the names, but as authentic material is probably held in LE I have not nominated lectotypes until the whereabouts of possible holotypes is clarified.

There is no doubt that these names represent variants within the species, most of which would have to be grown to be distinguished (maturity, branching, solasodine content, fruit colour, etc.). It would probably be more satisfactory to have named them under the "Code of nomenclature for cultivated plants" as they have been selected during variety trials for drug production. In the same paper five forms of *S. laciniatum* are described without Latin names and under these following terms 1. Spherical, 2. Dark green, 3. Light green, 4. Branching, 5. Compact form.

1. var. *acutifolium* Korneva, Rast. Resursy 8 (1972) 512, plate 3.

A plant with a strongly branching stem, branching low on main stem. Leaves 10-25 cm long, divided into 2-3 distant, pointed segments. Corolla large, rotate, broadly fimbriate. Berry ellipsoid, orange when mature, maturing early, solasodine content of leaves 2.4%. Habitat in the vicinity of Melbourne.

2. var. *brisbanense* Gerasimenko, Bjull. Glavn. Bot. Sada 59 (1965) 72-73.

Gerasimenko distinguishes this on the basis the larger number of leaf lobes, smaller seed, large number of seeds per berry, and high solasodine content. It was described from plants grown near Moscow from seed from Brisbane. This variety was later raised to specific rank, Gerasimenko (1970) 270.

3. var. *grandiflorum* Korneva, l.c. 511.

Plant very much branched from base of main stems. Leaves to 30 cm long, divided into 4-5 segments. Corolla to 4 cm diam., intense lilac, rotate, broadly fimbriate. Berry orange, medium maturity, solasodine content of leaves 1.8-2.1%. Habitat in the vicinity of Melbourne.

4. var. *grandifolium* Kornvea, l.c. 511, plate. 1.

Tall plant with robust stem to 5 cm diam., branching high up on main stem. Leaves large, to 40 cm long, divided into 5-6 segments. Corolla 4 cm diam., pale lilac, rotate, margin broadly fimbriate. Berry ellipsoid, pale brown when mature. Medium maturity, solasodine content of the leaves 1.8-2.1%. Habitat in the vicinity of Brisbane.

5. var. *hybridum* Korneva, l.c. 513, plate 4.

Plant not much branched, branching high on main stem. Leaves 10-40 cm long, with 4-5 segments. Corolla large, 4-5 cm diam., pale lilac. Maturity medium, solasodine content 1.5-1.8%. Habitat in the vicinity of Brisbane.

6. *var. patulum* Korneva l.c. 512, plate 2.

Plant with strongly branched stem, branching high on main stem. Leaves to 25 cm long, divided into 4-5 segments. Corolla small, stellate, pale lilac, not very fimbriate. Berry elongate-ellipsoid, orange when mature. Maturity late, solasodine content of the leaves 2.1-2.6%. Habitat in the vicinity of Brisbane and Sydney.

As is evident from the literature cited, *S. aviculare* has been intensively investigated in recent years, particularly in U.S.S.R., eastern Europe and New Zealand, as a source of solasodine. Selection of high yielding lines, plant breeding and agronomic trials are continuing in a number of countries. The most closely related species are *S. laciniatum*, *S. linearifolium* and *S. vescum*, but this trio all differ in leaf, corolla, fruit and seed characters. The great variety of leaf form, and the frequent absence of fruit (or notes on them) on herbarium specimens has resulted in a long history of confusion in the section.

Distribution and habitat (Map 21)

S. aviculare ranges from New Guinea, down the east coast of Australia to New Zealand and has become naturalised in S.A. It is most commonly found in disturbed sites, forest tracks, creek banks, roadsides through woodland in high rainfall areas.

Selected specimens

NEW GUINEA: *Eichler 18243*, 28.iv.1965, E slopes of Mt Wilhelm near Keglsugl airstrip (ADW).

QUEENSLAND: *Moriarty 1208*, 2.xi.1972, D'Aiguilar Range (ADW, CANB); *Jacks s.n.*, 5.viii.1968, Mt Blackwood near Mackay (ADW); *Collins 6*, 11.i.1974, Evelyn (ADW); *Hyland 5524*, 22.ix.1971, Herberton (ADW, FHA); *Webb & Tracey 8297*, Jan. 1969, Narayan (ADW).

NEW SOUTH WALES: *Slade & Coveny 1900*, 2.viii.1969, Copeland (ADW, NSW); *Briggs 2341*, 1.xi.1968, SE of Berrico (ADW, BRI, NSW); *Constable 6597*, 1.xii.1965, 8 km E of Urbenville (ADW, NSW); *Ingram s.n.*, 25.ii.1961, Mt Tomah (ADW).

LORD HOWE ISLAND: *Cornish 30*, Oct. 1936, Lord Howe (K).

VICTORIA: *Beaughlehole 35322*, 10.xii.1970, East Gippsland (acb, ADW, MEL); *Swan 182*, 14.xi.1975, Major Crk NW of Orbest (ADW); *Canning 2793*, 18.ii.1969, Alfred National Park (ADW, CBG); *Phillips s.n.*, 24.xi.1961, Darby Beach Wilsons Promontary (ADW, CBG).

TASMANIA: None seen.

SOUTH AUSTRALIA: (adventive) *Holdens.n.*, 13.i.1972, Coultia, Eyre Peninsula (AD, ADW, BRI, CANB, K).

20a. *Solanum cheesemanii* Gerasimenko, Nov. Syst. Pl. Vasc. Leningrad 7 (1970) 271.

Type citation: "Planta in prov. Moskou culta Nova Zeelandiae originaria, l.ix.1966, No. 37707, I. Buczkova, LE." (not seen).

Solanum aviculare Forst. f. var. *albiflorum* E. Cheesem., Trans. Roy. New Zealand, Bot. 52 (1920) 9-16.

Type citation: "Townson, Pukekohe, Auckland, New Zealand".

Syntypes: AK 7601-2 (2 sheets) (not seen).

Distribution

New Zealand.

Apart from cultivated plants this species has not been collected in Australia. Baylis (1963) has shown that this is a recessive, single gene mutant. The plants lack anthocyanin colouring in the stems, and other parts, and the leaflets are narrower than *S. aviculare*.

20b. *Solanum baylisii* Gerasimenko, Nov. Syst. Pl. Vasc. Leningrad 7 (1970) 272.

Type citation: "Planta in prov. Moskou culta Nova Zeelandiae originaria l.ix.1966, No. 37705 I. Buczkova LE," (not seen)

Solanum aviculare Forst. f. var. *latifolium* Baylis, Austral. J. Bot. 11 (1963) 168.

Type citation: G.T.S. Baylis, Great Island, Three Kings, New Zealand.

Holotype: OTA 938 (not seen).

Distribution

Islands off New Zealand.

Apart from cultivated plants this species has not been collected in Australia. Baylis (1963) has shown that this is a partially dominant, single gene mutant. Plants in cultivation have more globular fruits than *S. aviculare* and the fruits also appear drab coloured.

21. *Solanum laciniatum* Ait., Hort. Kew. 1 (1789) 246.

Type citation: "Native of New Zealand, Sir Joseph Banks Bart. Introduced 1772."

Lectotype: Bot. Mag. 10 (1796) t. 349, proposed by Baylis (1954).

Solanum pinnatifidum Lamk., Tabl. Encycl. 1 (1792) t. 115, fig. 4.

Type citation: "E. Peru".

Type material: Not seen, the illustration indicated above is stylised and could represent either *Solanum laciniatum* or *S. aviculare*.

Solanum pinnatifolium Salisb., Prodr. (1796) 133.

Salisbury cites *S. laciniatum* Soland. in Ait. Hort. Kew. 1 (1789) 247 and, hence, the name is superfluous.

Solanum reclinatum L'Her. ex Pers., Synopsis Plantarum 1 (1805) 225.

Type citation: "Colitur in hortis. Vid. le Botaniste-Cultivateur, 2 p. 134".

Type material: This was based on cultivated material and may now be at G. Not seen.

S. aviculare Forst. f. var. *laciniatum* (Ait.) Domin, Biblioth. Bot. 89 (1928) 1128.

S. laciniatum Ait. var. *fruticosum* Sweet, Hort. Brit. edit. 2, (1830) 385, nomen nudum.

S. laciniatum Ait. var. *herbaceum* Sweet, l.c. nomen nudum.

Literature

Curtis (1796) t. 349; Brown (1810) 445; Dunal (1813) 139; Dunal (1816) 8; Don (1837) 407; Walpers (1844) 41; Lehmann (1845) 345; Dunal in DC. (1852) 69; Black (1926) 497 as *aviculare*; Stapf (1928) t. 9154; Davis *et al.* (1938) 357; Hurst (1942) 370; Webb (1948) 158; Webb (1949) 50; Webb (1952) 94; Baylis (1954) 639-643; Black (1957) 746 as *S. aviculare*; Allan (1961) 835; Beadle, Evans & Carolin (1962) 400; Stary & Storchova-Burianova (1962) 245-248; Baylis (1963) 168; Verzar-Petri (1964) 241-254; Eichler (1965) 271; Gerasimenko (1965) 71; Gerasimenko & Reznikova (1965) 74; Baylis (1966) 283; Curtis (1967) 505; Gerasimenko (1967) 74; Baylis (1968) 221; Gerasimenko (1968) 505; Gerasimenko (1969) 51; Gerasimenko (1969a) 191; Korneva *et al.* (1969) 197; Kondratenko & Kibalchich (1969) 11; Gerasimenko (1970) 270; Gerasimenko (1971) 363; Korneva *et al.* (1972) 507; Beadle, Evans & Carolin (1972) 487; Willis (1972) 549; Shreter & Gerasimenko (1973) 75; Everist (1974) 463; Grieve & Blackall (1975) 599.

Common name: kangaroo apple.

A soft-wooded *shrub* 1-3 m tall, lasting several years, main stem to 10 cm diam., becoming spreading and straggly with age. Glabrous except for minute glandular hairs on young growing tips, buds, and few sparse simple hairs on seedlings and young leaves, soon glabrescent, general aspect green, or stems suffused purplish. *Leaves* variable in size and lobing even on same plant; herbarium specimens often inadequate to show range of leaf form; lobed leaves 15-30 x 10-15 cm, broadly ovate, deeply pinnatisect, (1-) 7 (-9) lobes each to 10 x 1 cm, lanceolate, sinuses rounded, not reaching midrib, lower pair of lobes usually smaller, leaf base cuneate, more or less equal continued down the petiole some distance, lobe apex blunt to acuminate, all forms of intermediates occur to adult leaves, (5-) 10 (-20) x (1-) 1.5 (-4) cm, lanceolate, entire, base cuneate, apex acuminate; petiole 1 cm long. *Inflorescence* a scorpioid cyme, 5-15 cm long, simple or forked from base, often in axil of stem fork or leaf, pedicellate flower may also occur in fork, few to 10 flowers; peduncle to 4 cm long; floral rhachis to 10 cm long; pedicel 1.5-3 cm long, slender. *Calyx* tube 3-4 mm long; lobes 2 mm long, short, broad, margins almost scarious; acumen 1 mm long, bluntly mucronate. *Corolla* 3-5 cm diam., rotate, interacuminal tissue well

developed, exceeding acumens, lobes appearing emarginate, often showy, deep purple-blue, close to RHS Aster Violet 38/1-38/2. *Filaments* (Fig. 160) 3-4 (-5) mm long; anthers 3-4 mm long, oblong, free. *Ovary* 1.5-3 mm long, bluntly conical; style 6-9 mm long; stigma capitate, shortly bilobed, distinctly papillose. Fruiting rhachis 10-20 cm long; pedicels 2-3 cm long, lengthening and firming; calyx to 5 x 5 mm, enlarged and appressed, covering base of fruit; *fruit* (Fig. 149) 1.5-2 cm diam., oval to obovate, first green, later paling to yellow or orange-yellow, succulent, readily shed when ripe. *Seeds* about 2.5 mm long, concentrically reticulate, reddish brown; stone cell masses (1-) 2-2.5 (-3.5) mm,



Fig. 19. *Solanum laciniatum* Ait. Drawn from specimen collected by D. Sparrow from Belair, SA (ADW 40840). $\times 2/3$.

rounded, rarely faceted; (116-) 211 (-344) seeds and (33-) 46 (-78) stone cell masses in twenty fruits counted. (Fig. 19.)

Chromosome number: $n = 46$ Baylis (1954).

Notes

The following forms have been described:

1. forma *australiense* Gerasimenko, Rast. Resur. 7 (1971) 363
2. forma *cultum* Gerasimenko, l.c.
3. forma *novozeylandicum* Gerasimenko, l.c.
4. forma *tasmanicum* Gerasimenko, l.c.
5. forma *viridicaule* Gerasimenko, l.c.

S. laciniatum was long confused with *S. aviculare* until Baylis (1954) distinguished them more clearly. Inadequate specimens are difficult to distinguish but characters of the corolla, mature fruit, and seed are reliable ways to separate the two species in addition to the chromosome number. *S. laciniatum* can be a vigorous coarse grower and has showy flowers. In recent years there has been much interest in both species as sources of solasodine for the manufacture of cortico-steroid drugs (Collins, 1976; Bradley et al., 1978; Mann, 1979). Both species have a rapidly enlarging literature on agronomic aspects of their culture and chemical manipulation of their products. Many field trials have been grown particularly in the U.S.S.R., eastern Europe and New Zealand, and numerous collections of original seed have been made for these trials. Distinctive growth forms have been recognised but are best treated under the 'Code of Nomenclature for Cultivated Plants'.

Distribution and habitat (Map 12)

South eastern Australia in Vic., Tas. and south eastern S.A.; adventive in W.A. and New Zealand. Collected from hollows in stabilised sand dunes, creek lines, road sides in scrubs and woodlands usually in mesic sites.

Selected specimens

VICTORIA: Tilden s.n., 10.xi.1912, Point Lonsdale (BM, E, G, K); Phillips 162, 23.x.1971, Mornington Peninsula (ADW, CBG); Beaglehole 38305, 12.v.1972, French Island (acb, ADW, MEL); Symon 1, 3.xi.1959, McKenzie Falls, Grampians (ADW).

TASMANIA: O'Grady s.n., Oct. 1955, Pt Arthur (NSW); Rodway 6498, Nov. 1900, Hobart (NSW).

SOUTH AUSTRALIA: Symon 10562, 27.i.1976, Waitpinga (ADW, B, CANB, L, MO, NT); Simpson s.n., 27.x.1967, between Mt Gambier and Glencoe (AAU, ADW, CANB); Symon & Henderson 7632, 3.iii.1972, between Stirling and Aldgate (ADW, B, BRI, CANB, L); Alcock 1342, 5.iii.1967, Mt Dutton Bay (AD, ADW).

WESTERN AUSTRALIA: (adventive) Ford s.n. May 1975, Albany (ADW); Gardner s.n., 6.iv.1960, Bassendean (PERTH); Tomblason 1707, Aug. 1966, Sth Mt Barker (PERTH).

22. *Solanum linearifolium* Gerasimenko [Byull. Glavn. Bot. Sada 59 (1965) 71-72] ex Symon, sp. nov.

Original citation: The species was described from plants from seed from Australia (Canberra) cultivated near Moscow.

Type material: As no type was nominated the name is invalid (Art. 37, I.C.B.N.). A holotype is nominated here: M. Gray and E. D'Arnay 5445, 20.iii.1964, Lake George, New South Wales. (CANB; isotypes ADW, OTA). Specimens grown from this collection are at ADW and NSW.

¹The name Gerasimenko has been variously transliterated and appears as Herasimenko in 'Index Kewensis' and as Gerasimenko in 'Kew Record of Taxonomic Literature'. The preferred translation is Gerasimenko.

Literature

Gerasimenko (1970) 274; Burbidge & Gray (1970) 320; Willis (1972) 550.

An erect, soft-wooded *shrub*, 1-2 (-4) m tall, lasting several years, becoming woody towards base, straggly with age, not clonal. Sparsely and minutely pubescent, simple and glandular hairs on leaves, growing points, calyx and corolla tips, unarmed, general aspect green. Lower and juvenile *leaves* to 15-40 x 10-20 cm, broadly elliptic to ovate, 3-11-lobed, sinuses rounded and deeply cut to 0.5-1 cm of mid-vein; lobes 2-12 x 0.5-1 cm, linear-



Fig. 20. *Solanum linearifolium* Gerasimenko ex Symon. Drawn from herbarium specimen of plant grown in Birmingham and originally (Gray & D'Arny 5445) from Lake George, NSW (ADW 34951, 38720 and 39258). $\times \frac{2}{3}$.

lanceolate or long-triangular, leaf and lobe apex acute to acuminate; later and simple leaves (3-) 5-7 (-15) x (0.3-) 0.5-0.8 (-1) cm, narrowly elliptic to linear, mid-vein raised above and below, laterals obscure, apex acuminate to subulate, base long cuneate, scarcely separate from narrowly winged petiole; all leaves shortly petiolate, raised lines on stem downwards from base of petiole. *Inflorescence* a cyme of few to 10 flowers, from stem fork or leaf axil, occasionally forked at base with a pedicellate flower in fork, usually lacking common peduncle; floral rhachis to 10 cm; pedicels (1.5-) 2-3 (3-4) cm long, relatively slender, articulation may be a few mm above base. *Calyx* 2-3 mm long, campanulate, lobes bluntly triangular, acumens 1 mm long, blunt. *Corolla* (2.5-) 4 (-4.5) cm diam., broadly stellate-rotate to pentagonal, interacuminal tissues well developed, usually exceeding the acumen by few to 5 mm, lobe then emarginate, corolla appearing shortly 10-toothed, shallowly campanulate, an intense violet-purple when fresh, close to RHS Violet 36/1 and Mineral Violet 635/1. *Filaments* (Fig. 160) 2-3 mm long; anthers 3 mm long, oblong. *Style* 7-8 mm long, slender, slightly sigmoid, lavender; stigma capitate, lavender. Fruiting cymes pendent; pedicels to 3 cm long, swollen towards apex, articulation above base 1-10 mm long; *fruit* (Fig. 149) 1.5-2 cm diam., globular to slightly ovoid, an ochre-yellow ground, flushed or speckled with reddish-purple in the upper half giving a brownish effect, no dark colour develops under calyx, readily shed without calyx when ripe, soft, succulent and aromatic. *Seeds* 2-2.5 mm long, minutely ridged with reticulate-concentric pattern overlain with larger, irregular, transverse ridges, pale buff to light grey, about 170-210 per berry; stone cell masses conspicuous, 2-3 (-4) mm long, about 20-27 per berry. (Fig. 20.)

Chromosome number: $n = 23$ Gerasimenko (1965).

Note

This species is distinctive but inadequate specimens can be confused with narrow leaved specimens of *S. vescum*.

Distribution and habitat (Map 15b)

Eastern Vic. and south eastern N.S.W. on coastal ranges and tablelands. Often in disturbed sites, forest margins and tracks, rocky outcrops (e.g. near Lake George), creek and river gorges and on roadsides through eucalypt woodlands.

Selected specimens (total seen about 50)

NEW SOUTH WALES: *McKee* 8822, 2.xii.1961, Kowen, A.C.T. (CANB, K); *Rodds* s.n., 6.xi.1966, Mt Tomah, (ADW, NSW); *Constable* 5672, 22.i.1965, Burragorang Lookout (ADW, BRI, NSW).

VICTORIA: *Beaglehole* 41368, 4.ii.1973, Nunmiong Plateau, Reedy River Chasm (acb, ADW, MEL); *Beaglehole* 36840, 19.ii.1971, between Little Tambo and Mt Tambo (acb, ADW, MEL); *Beaglehole* 38173, 12.ii.1972, 5 km N of Toongabbie (acb, ADW, MEL).

23. *Solanum vescum* F. Muell., Trans. Vict. Inst. 1 (1855a) 67-70; Hooker's J. Bot. Kew Gard. Misc. 7 (1855) 237.

Type citation: "Sand-ridges around Lake Wellington, Gipps Land, on the coast towards the mouth of the Snowy River, on grassy hills at the Tambo, the Nicholson's River and Clifton's Morass, on the rich shady banks of the Latrobe River, and near the Buchan River".

Lectotype: Several of the syntypes have been located. At K is a sheet labelled "*Solanum vescum* ferd. Mueller, Lake Wellington, Gipps Land, ferd. Mueller". This sheet has been labelled isotype by Baylis. At MEL are two sheets, (i) MEL 11430 is labelled "*Solanum vescum* ferd. Mueller Ad litora arenosa juxta ostium fluvia Snowy River Febr. 55 Dr. ferd. Mueller"; (ii) MEL 11429 is labelled "*Solanum vescum* (*S. decurrens*) Guniang Natives Sandy places near the entrance of the Snowy River Jan. 55 Dr. ferd. Mueller". I propose as lectotype MEL 11429.

Solanum aviculare Forst. f. var. *vescum* (F. Muell.) Domin, Biblioth. Bot. 89 (1928) 1128.

S. vescum F. Muell. var. *kibalczezii* Gerasimenko, Rast. Resur. 9 (1973) 424.

Type citation: Plants cultivated in the Moscow region from seed from Australia (New South Wales, Blue Mountain), 22.vii.1971 No. 19284, I. Gerasimenko.

Holotype: LE (not seen).

S. vescum F. Muell. var. *davidii* Gerasimenko, Rast. Resur. 9 (1973) 424.

Type citation: Plants cultivated in the Moscow region from seed from Tasmania, 22.vii.1971, No. 18345, I. Gerasimenko.

Holotype: LE (not seen).



Fig. 21. *Solanum vescum* F. Muell. Drawn from field grown plant at the Waite Institute, from seed from Beaglehole 37582, collected at Fairy Dell Scenic Reserve, Bruthen, Vic. (ADW 40410). $\times \frac{2}{3}$.

Literature

Mueller (1856a) 165, 336; Mueller (1864-5) t. 62; Mueller (1868) 144; Mueller (1882) 95; Mueller (1888) 400; Mueller (1888) 361, fig. 103; Moore (1893) 332; Maiden (1899) 625; Dixon (1906) 221; Maiden (1909) 1012; Petrie (1912) 229; Cambage (1912) 646; Hamilton (1916) 171; Maiden & Betcher (1916) 181; Hamilton (1917) 287; Hurst (1942) 377; Gascoigne *et al.* (1948) 44; Webb (1948) 160; Foldesi (1956) 61; Beadle, Evans & Carolin (1962) 401; Baylis (1963) 168; Gerasimenko (1965) 71; Gerasimenko & Reznikova (1965) 74; Curtis (1967) 506; Baylis (1968) 221; Gerasimenko & Reznikova (1968) 505; Gerasimenko (1969) 51; Kondratenko & Kibalchich (1969) 11; Korneva *et al.* (1969) 197; Burbidge & Gray (1970) 320; Gerasimenko (1970) 270; Beadle, Evans & Carolin (1972) 487; Willis (1972) 549; Gerasimenko (1973) 420; Everist (1974) 464.

A tall or wide-spreading, soft-wooded *shrub* 1-2 m high, lasting several years, becoming woody at base; glabrous except for sparse and minute, simple and glandular hairs on corolla, calyx tips, seedlings and young shoots, unarmed, general aspect green. *Leaves* variable in size and shape; lobed leaves to 35 x 20 cm, usually not so large, broadly ovate, deeply pinnatisect 4 (-6) lobes, lower pair usually smaller, 2 x 0.3 cm, upper lobes 5-10 x 0.8-1.2 cm, almost linear, apex rounded or acute, sinuses rounded, cut to within 0.8-1 cm of midvein; all leaves cuneate down petiole, decurrent on stems as narrow raised wings; all intermediate shapes occur to entire leaves, 5-15 x 0.5-1 cm, linear-lanceolate, sessile or petiole narrowly winged, usually with raised decurrent lines on stems. *Inflorescence* a scorpioid cyme, from leaf or stem axil, sometimes forked from near base in vigorous plants; peduncle 0-5 cm long, a single pedicellate flower may occur in fork, floral rhachis 1-5 cm long; pedicels 2-2.5 cm long. *Calyx* 3-4 mm long, campanulate, fleshy; lobes 2 mm long, broad, acumens 1 mm long. *Corolla* about 4 cm diam., rotate-stellate, lobes distinct though broad, interacuminal lobes slightly exceeding acumen, scarcely creating a 10-lobed effect, colour RHS Aster Violet 38/2. *Filaments* (Fig. 160) 5 mm long, slender; anthers 3-4 mm long, oblong. *Ovary* glabrous; style 1 cm long; stigma capitate to slightly bilobed, pale grey. Floral rhachis enlarged in fruit, to 15 cm long; fruiting pedicels 3-5 cm long, deflexed; mature *fruit* (Fig. 149) 2-2.5 cm diam., globular, or slightly oval, green, at maturity paling to greenish-ivory, becoming succulent and aromatic "with distinct rather unpleasant smell". *Seeds* 2 mm long, greyish-brown with fine concentric reticulations visible under lens; stone cells 1-2 mm long, rarely more, not often faceted, 40 fruits counted gave (25-) 235 (-422) seeds and (23-) 50 (-73) stone cell masses per fruit. (Fig. 21.)

Chromosome number: n = 23 Baylis (1963).

Notes

S. vescum var. *kibalczezii* was distinguished from the type by the absence of winging on the stem, the leaves petiolate, calyx with dark violet tips, corolla margined, stone cell masses smaller than the seed and solasodine content low. *S. vescum* var. *davidii* was distinguished from the type by the unwinged stems, petiolate leaves, calyx lobes without dark tips, marginate corolla, stone cell masses smaller than the seeds and low solasodine content.

I prefer to consider these as variants within the species. The length of the petiole varies to some extent with the position of the leaves, lower lobed leaves appear petiolate at least on herbarium specimens whilst the upper leaves are clearly sessile. The colour of the calyx tips is not apparent in dried material and in any of the seed preparations there is variation in the size of the stone cell masses. The small percentage differences in solasodine content even if consistent are likely to vary somewhat between position of leaf, age of leaf and the site where the plants are grown. As with the varieties named under *S. aviculare* and *S. laciniatum* I consider these best treated under the 'Code of Nomenclature for Cultivated Plants'.

S. vescum shares with *S. simile*, *S. symonii* and *S. capsiciforme* the greenish colour of its ripe fruits and with *S. linearifolium* the linear mature leaves. It differs from others in the section in its sessile, or nearly sessile, leaves with raised decurrent lines on the stem

from the petiole base. The lobes of the divided leaves are often narrow but it may at times be difficult to separate from *S. laciniatum*.

Distribution and habitat (Map 13)

South eastern Australia from southern Qld through N.S.W. and Vic. to Tas.; substantially subcoastal in distribution. It has been collected from consolidated coastal dunes, stream banks and margins of forest and woodland.

Selected specimens

QUEENSLAND: *Webb & Tracey 8349*, Mt Glorious (ADW, B, K).

NEW SOUTH WALES: *Rodd 692*, 5.viii.1968, Seal Rocks (ADW, NSW); *Tracey & Moriarty 1638*, 28.i.1975, Surface Hill, ESE of Tenterfield (ADW, BRI, CANB); *Constable 1259*, 21.ix.1961, Clyde River, 8 km S of Sassafras (ADW, NSW); *Gray 5587*, 19.xi.1964, Tiddbinbilla (ADW, CANB); *Gray 5687*, 10.ii.1965, Merimbula (ADW, CANB); *Gray et al 5689*, 16.ii.1965, Sussex Inlet (ADW, CANB); *Dunlop 600*, 21.viii.1969, Warrumbungle Nat. Pk (ADW, CBG).

VICTORIA: *Beaughtehole 34263*, 7.x.1970, Tullaberga Island (acb, ADW); *Phillips 78*, 14.ix.1971, Ricardo Point, Orbst dist. (ADW, CBG); *Beaughtehole 32486*, 16.xii.1969, Mallacoota Inlet (acb, ADW); *Gray 5727*, 27.x.1964, Nug Nug (ADW, CANB).

TASMANIA: *Martin s.n.*, 17.xii.1971, Friendly Beaches (ADW); *Martin s.n.*, 28.v.1969, Fern Tree (ADW); *Mueller s.n.* 1869, Base of Mt Fields (MEL).

24. *Solanum simile* F. Muell., Trans. Philos. Soc. Victoria 1 (1855) 18-19.

Type citation: "On less fertile plains on the Murray and Angas Rivers, on Spencer's and St. Vincent Gulfs and in Kangaroo Island".

- Syntypes*: 1). Angas River, Nov. Holl. austr. *F. Mueller* (MEL).
 2). Spencer's Gulf, *Ferd Mueller*, (K).
 3). St Vincent's Gulf, *Ferd. Mueller* (3 sheets) (MEL, L).
 4). Kangaroo Island, March 1847 (? *Waterhouse*) (MEL).
 5). South Australia, *F. Mueller*, (E, CGE, L).

Lectotype: I propose the third of these, MEL 12328, as lectotype with isoelectotypes MEL 12326 and MEL 12329 and at L.

Solanum simile F. Muell. var. *typicum* Domin, Repert. Spec. Nov. Regni Veg. Beih. 12 (1913) 130, nom. invalid.

Solanum laciniatum Ait. β R. Br. Prodr. (1810) 445, grad. ambig., "Goose Island Bay (Bay II), larger island, May 1803, pro parte".

Literature

Mueller (1855) 18-20; Mueller (1856) 165; Bentham (1868) 448; Mueller (1868) 145; Mueller (1882) 96; Mueller (1888) 361; Maiden (1889a) 543-545; Tate (1890) 144; Mueller & Tate (1896) 373; Moore (1893) 332; Maiden (1899) 625; Richards (1882) 136; Bailey (1901) 1080; Cambage (1902) 190; Dixon (1906) 221; Maiden (1909) 1012; Bailey (1913) 354; Maiden & Betche (1916) 181; Cambage (1918) 708; Chisholm (1925) 294, 297; Black (1926) 497; Domin (1928) 1128; Ewart (1931) 1004; Black (1957) 746; Irvine (1957) 128; Baird (1958) 102-107; Foldesi (1965) 61; Aurich (1966) 447; Gerasimenko (1970) 274; Willis (1972) 550; Everist (1974) 465; Grieve & Blackall (1975) 599.

An erect, soft wooded *shrub*, 0.5-1.5 (-2) m tall, lasting several years, not clonal in habit. Glabrous except for minute hairs on petal tip, unarmed, general aspect green. Juvenile *leaves* with 2-4 shallow lobes towards base, lobes bluntly triangular, apices rounded, sinuses rounded and shallow; mature leaves 4-8 x 1-2 cm, entire, (rarely with 1-4 small lobes towards base), elliptic or lanceolate, apex rounded, acute or long acuminate, base almost equal, leaves of herbarium specimens often folded along midrib and slightly recurved. *Inflorescence* a scorpioid cyme (occasionally forked in vigorous plants), from branch fork or leaf axil, common peduncle often short or absent, (basal flower pedicellate); floral rhachis 0.5 cm long; small clusters of 1-3 sessile or pedicellate flowers; pedicels 8-10 mm long. *Calyx* 3-4 mm long, campanulate, lobes 1-2 mm long, blunt, acumen 1 mm long, fleshy. *Corolla* 2-3 cm diam., rotate, interacuminal tissue well

developed, exceeding the acumens which bear minute glandular and simple hairs, colour RHS Campanula Violet 37/2 and 37/3. *Filaments* (Fig. 160) 1.5-2 mm long; anthers 2 mm long, oblong, stout, loosely erect. *Ovary* 1-1.5 mm long; style 5-7 mm long, declinate, mauve, slightly expanded towards stigma and projecting beyond anthers. *Fruit* (Fig. 149) 1.5-2 cm long, globular, marbled green, ripening green, sometimes tinged purple, becoming slightly translucent, succulent and aromatic when ripe, readily shed without pedicel. *Seeds* 2-2.5 mm long, greyish or dark brown, rugose-ruminant under a lens, stone cells 1-3 mm diam., rounded and often faceted but seeds not usually adherent. Counts of



Fig. 22. *Solanum simile* F. Muell. Drawn from pot grown plant from seed collected by C.R. Alcock near Tumby Bay, SA (ADW 40862). $\times 2/3$.

seeds and stony concretions show variation in numbers, one collection of 8 fruits had (32-) 67 (-86) seeds and (18-) 25 (-35) concretions (the lowest mean number). Another collection of 8 fruits had (105-) 125 (-154) seeds and (22-) 30 (-35) concretions (the highest mean number of seeds). (Fig. 22.)

Chromosome number: $n = 23$ Baylis (1963); Gerasimenko & Reznikova (1968) and in addition, B. Randell has counted $n = 23$ in material of Symon 4721 and 8469 (ADW).

Notes

S. simile is one of the most widespread species of this section ranging from W.A. through S.A., north-western Vic. to northern N.S.W. The plants occur as scattered clumps of relatively few individuals and rarely as large populations; they often appear after local disturbance and disappear after a few years.

The juvenile leaves are never as deeply lobed as those of *S. aviculare*, *laciniatum*, *linearifolium* and *vescum*, nor are the stems as coarse and massive. The mature fruit are usually dull green when ripe but are reported to be flushed purple to almost black in some collections; colouring may in part be dependant on temperature. *S. simile* shares with *S. capsiciforme*, *S. symonii* and *S. vescum* the green colour of the mature fruit, relatively smaller flowers, and a more slender habit. It is most closely related to *S. symonii* and specimens are sometimes difficult to distinguish from this species.

Distribution and habitat (Map 7)

Drier regions of southern Australia from W.A. to northern N.S.W., nearly corresponding with the principal areas of mallee eucalypt woodlands. Usually in sandy (often alkaline) soils, at the base of dunes, roadside spoil heaps, alluvial gravels and terraces of seasonally dry creeklines, often after fires.

Selected specimens (total seen about 200)

WESTERN AUSTRALIA: *Pickering s.n.*, Feb. 1966, Corrigin (ADW, CANB, DAV, PERTH); *George 8031*, 15.ix.1966, Queen Victoria Rocks SW of Coolgardie (ADW, PERTH).

NEW SOUTH WALES: *Symon 9868*, 6.ii.1975, 28 km W of West Wyalong (ADW, CANB, L); *Curtin*, Dec. 1952, Forbes district (CANB).

VICTORIA: *Beauglehole 7189*, 10.ix.1969, Kulkyne Nat. Pk (acb, ADW, MEL); *Phillips s.n.*, 15.xi.1962, 19 km S of Ouyen (ADW, CBG).

SOUTH AUSTRALIA: *Eichler 12852*, 20.ix.1956 Gammon Ranges (AD, CHR, E, M); *Wilson 1447*, 3.viii.1960, 10 km W of Murray Bridge (AD, E, CHR, NY); *Kraehenbuehl 189*, 17.ix.1960, Mt Remarkable (AD, CANB, CHR, LE, M, W).

25. *Solanum symonii* Hj. Eichl., Taxon 12 (1963) 296; a name replacing *S. fasciculatum* F. Muell. nom. illeg. non *S. fasciculatum* Vell., Fl. Flum. (1825).

Type citation: "Ad flumen Phillips River Novae Hollandiae austro-occidentalis".

Type material: A sheet MEL 12398 is labelled "Phillips River *Solanum fasciculatum* F. Muell. G2 Shrub 4-5 ft." This is proposed as lectotype. A possible isolectotype MEL 12850 is simply labelled "Maxwell S.W. Australia".

Solanum fasciculatum F. Muell., Fragm. 1 (1859) 123, nom. illegit.

Solanum simile F. Muell. var. *fastigiatum* Domin, Repert. Spec. Nov. Regni Veg. Beih. 12 (1913) 130. This was an orthographic error and was intended to be based on *S. fasciculatum* F. Muell, it was corrected by Domin as: *Solanum simile* F. Muell. var. *fasciculatum* (F. Muell.) Domin, Bibl. Bot. 89 (1929) 1129.

Solanum simile F. Muell. var. *fasciculatum* (F. Muell.) J.M. Black (1926) 497, comb. illegit., was misapplied by Black to *S. capsiciforme*.

Solanum laciniatum var. *integrifolium* Domin, Bibl. Bot. 89 (1929) 1128, nom. nud.

Type citation: Domin discusses this name when considering *S. simile* var. *typicum* to which he attributes *S. laciniatum* β *Fruticosum*, foliis indivisis R. Br. Prodr. (1810) 445, and cites "Goose Isl. Bay, larger Island".

Type material: Brown collected specimens of five species of section *Archaeosolanum* during his period in Australia. Their identity was confused at that time and was further muddled by the same Bennett numbers being

given to different collections. The name *Solanum laciniatum* var. *integrifolium* appears on a sheet at BM with the label "Bennett 2666, 4 Sol. lac. β . var. *integrifolium* prodr. 445 Hawkesbury 1803" which appears to be *S. linearifolium* and on a sheet "Bennett 2665 Sol. lac. var. *integrifolium* Bay 10 South Coast Mch. 1802", which is *S. simile*. A third collection has the label "R. Br. Sol. lac. var. *integrifol.* Goose Isl. Bay 1803" and is *S. symonii*. At K a collection bears the label "Bennett 2665 *Solanum laciniatum* var. *integrifolium* Goose Island Bay, larger island May 1803" and is *S. symonii*, here proposed as lectotype to typify "*Solanum laciniatum* β . Fruticosum foliis indivisis (J.) v.v. "R. Br. Prodr. (1810) 445.



Fig. 23. *Solanum symonii* Hj. Eichl. Drawn from field grown plant at the Waite Institute, from seed collected by C.R. Alcock from near Pt Lincoln, Hd of Sleaford, Sect. 520, SA (ADW 40865). $\times \frac{2}{3}$.

Literature

(1). as *S. fasciculatum* F. Muell.

Mueller (1868) 144; Black (1932) 39, 47; Foldesi (1965) 61; Tate (1890) 144; Mueller (1882) 96. Cleland & Black (1941) 244.

(2). as *S. symonii* Hj. Eichl.

Eichler (1965) 272; Gerasimenko & Reznikova (1965) 74; Gerasimenko & Reznikova (1968) 505; Gerasimenko (1969) 51; Gerasimenko (1971) 270; Everist (1974) 465; Grieve & Blackall (1975) 599.

An erect soft-wooded *shrub*, 1-1.5 (-2) m tall, lasting several years, not clonal in habit, stem terete; all parts glabrous except for minute simple and glandular hairs on young growing points, calyx and corolla tips and occasional stout conical hairs on lower mid-veins of younger leaves, unarmed, general aspect green. Lobed *leaves* 10-18 x 3-8 cm, ovate-lanceolate, with 1-7 lobes, sinuses rounded, rarely cut half way to midrib, lobes bluntly triangular, leaf and lobe apex rounded or acute, leaf base equal or unequal, tapering cuneate, petiole 2-3 cm long; simple leaves (3) 5-12 x 0.5-1.5 cm, lanceolate to elliptic, apex rounded or acute, base long cuneate; petiole 1-1.5 cm long. *Inflorescence* a scorpioid cyme from branch or leaf axil, (sometimes forked at base in vigorous specimens); peduncle 0-3 cm long, a single pedicellate flower may occur in the fork, floral rhachis to 5 cm long, sessile clusters of 1-3 flowers also occur; pedicels 1-1.5 cm long. *Calyx* 4-5 mm long, lobes 2 mm long, broadly triangular, rounded, acumen 1 mm long, blunt, almost fleshy. *Corolla* 3-4 cm diam., rotate, interacuminal tissue well developed, extending beyond petal tips then appearing emarginate giving the corolla a shallowly 10-lobed appearance, pale lavender-purple. *Filaments* (Fig. 160) 3-4 mm long; anthers 2-3 mm long, oblong, loosely erect. *Ovary* glabrous; style c. 1 cm long, exerted through side of anther column, pale mauve; stigma capitate, pale. *Fruits* (Fig. 149) 1.5-2 cm x 1-1.5 cm, oval to obovoid, marbled green with darker green stripes or tinged purple at maturity, becoming succulent when ripe, calyx not greatly enlarged, covering the base of the fruit. *Seeds* 2 mm diam., greyish or reddish-brown, finely reticulate, stone cell masses to 2 mm diam., rounded, often faceted, seeds not usually adherent to them. Fruit preparations give the following number of seeds and stone cells per fruit: 3 fruits 159, 176, 198 seeds and 52, 58, 61 granules, 5 fruits (200-) 233 (-258) seeds and (55-) 67 (-71) granules. Cotyledons c. 14 x 5 mm long, lanceolate, with a few glandular hairs, hypocotyl and petioles with distinct simple hairs, first true leaf elliptic c. 12 x 6 mm. (Fig. 23.)

Chromosome number: $n = 46$ Baylis (1963); Gerasimenko & Reznikova (1968) and, in addition, R. Randell has counted $n = 46$ for the collection *Alcock 506*, Eyre Peninsula (ADW).

Notes

Although the name and description were published by Mueller in 1859, the species was much confused with *S. simile* during most of its history. It is most closely related to *S. simile* and *S. vescum* with which it shares green fruits, moderate stature and flower size.

Distribution and habitat (Map 8)

S. symonii has a narrowly coastal distribution from about Geraldton in W.A. to the toe of Yorke Peninsula in S.A. It has not yet been collected from nearby Kangaroo Island. The plants are commonly found in stabilised dunes, in sand over limestone and about spoil heaps; several collections have come from highly gypseous sites.

Selected specimens (total seen about 75)

WESTERN AUSTRALIA: *Helms s.n.*, 10.ix.1899, Leederville (BM, BRI, K); *Broadbent 1294*, 22.viii.1953, Dinner Hill (ADW, BM, E); *Beaglehole 12488*, Cape Leeuwin S. of Augusta (acb, ADW, CANB).

SOUTH AUSTRALIA: *Wilson 1629*, 13.ix.1960, Head of the Bight (AD, ADW, E); *Symon 4485*, 13.ii.1967, 19 km E of Ceduna (ADW, BIRM, CANB, K, NSW, PERTH); *Symon 9548b*, 6.x.1974, Stenhouse Bay, Gypsum field (ADW).

26. *Solanum capsiciforme* (Domin) Baylis, Austral. J. Bot. 11 (1963) 168.

Solanum simile F. Muell. var. *capsiciforme* Domin, Repert. Spec. Nov. Regni Veg. Beih. 12 (1913) 130, *basionym*.

Type citation: "Central Australia: Near Lake Gillies leg. Burkett." (Lake Gillies is west of Iron Baron, Eyre Peninsula, South Australia).



Fig. 24. *Solanum capsiciforme* (Domin) Baylis. Drawn from field grown plant at the Waite Institute, from seed from C.R. Alcock, collected in the Hd of Hawker, Eyre Peninsula, SA (ADW 40973). $\times \frac{2}{3}$.

Holotype: At K is a sheet labelled "*Solanum simile* F. Muell. var. (*S. fasciculatum* var. F. Muell.) Lake Gillies, *Burkett* Herb. F. Mueller 1868". This was labelled "Type of *S. simile* var. *capsiciforme* Domin 1913, Fedde Rep 12, 130" by G.T.S. Baylis 9.7.1954.

Solanum simile F. Muell. var. *fasciculatum* (F. Muell.) J.M. Black (1926) 497, comb. illegit., is a misapplication of *S. fasciculatum* F. Muell. as from the description Black clearly refers to *S. capsiciforme*.

Literature

Robertson in Black (1957) 747 as var. *capsiciforme*; Gerasimenko & Reznikova (1965) 74; Gerasimenko (1969) 51; Gerasimenko (1970) 270; Everist (1974) 465; Grieve & Blackall (1975) 599.

Common name: native pepper.

A soft-wooded, short-lived, erect *shrub* to 1 m, not reproducing vegetatively. Glabrous except for minute glandular and simple hairs on young growths and calyx and corolla tips, unarmed, general aspect green. Juvenile *leaves* c. 8 x 2 cm, oblong-lanceolate, margins undulate, up to 11 lobes, sinuses shallow and rounded, rarely cut more than half way to mid-vein; adult leaves linear-lanceolate, 5-10 x 0.5-1 cm, entire, base long-cuneate, apex rounded or acute; petiole 0.5-1 cm long. *Inflorescence* a 1-6 flowered cyme, in leaf axil or stem fork; peduncle 0-10 mm long, floral rhachis to 5 mm long, solitary pedicellate flowers may occur; pedicels 1-2 cm long, slender. *Calyx* 2-3 mm long, tube 1-2 mm long; lobes 1 mm long, acute. *Corolla* 2-3 cm diam., rotate, interacuminal tissue well developed, exceeding petal tip thus appearing somewhat emarginate, colour RHS Sea Lavender Violet 637/2 and Aster Violet 38/2. *Filaments* (Fig. 160) 1-2 mm long; anthers 2-3 mm long, oblong, stout, free, loosely erect. *Ovary* 1-1.5 mm long, glabrous; style 7-8 mm long, pale purple; stigma capitate and slightly expanded, pale. Fruiting peduncles deflexed; calyx slightly enlarged; *fruit* (Fig. 149) 1.5-2.5 cm long, conical, (distinct amongst all native solanums), green at maturity, sometimes slightly pruinose, little flesh, well filled with seeds and stony granules, shed with pedicel when mature. *Seeds* 1.5 mm long, brown or grey-brown, minutely but distinctly reticulate. A count of 10 fruits had (80-) 100 (-130) seeds and (30-) 40 (-50) granules per fruit. Granules 1-1.5 mm long, rarely greater than 2 mm, globular or faceted and often with seeds adherent, relatively large and conspicuous in seed preparations. (Fig. 24.)

Chromosome number: $n = 23$ Baylis (1963), in addition B. Randell has counted $n = 23$ on a plant from Eyre Peninsula (ADW 31610).

Notes

S. capsiciforme is the most distinctive species in the section. It is most closely related to *S. simile* and *S. symonii* and shares with those two species the relatively shortly lobed juvenile leaves, smaller shrubby habit and green fruits. No other species has such reduced leaves nor such conical fruits which are scarcely succulent when ripe.

Of interest are recent collections from the western side of St Vincent Gulf and on the Blanchetown-Waikerie Road in S.A., indicating a tendency to spread along roadside disturbances.

Distribution and habitat (Map 6)

W.A. in the southern drier areas between Perth and Esperance and in S.A. on Eyre and Yorke Peninsula, Kangaroo Island and more recently several collections west of St Vincent Gulf. It is generally found in disturbed sites on sandy soils or in sand over limestone in open shrub and woodland formations.

Selected specimens (total seen about 60)

WESTERN AUSTRALIA: *Ashby s.n.*, 7.ix.1966, N of Borden (AD, H, L, PERTH, UC); *Wrigley s.n.*, 21.x.1968, 35 km from Broomehill towards Gnowangerup (ADW, CBG, NSW).

SOUTH AUSTRALIA: *Whibley* 307, 6.x.1958, 16 km SW of Buckleboo (AD, B, BM, M, IA, UC); *Symon* 4272, 9.x.1966, western end of Hambidge Reserve, Eyre Peninsula (ADW, BIRM, CANB, DAV, NSW).

Section 9. *Brevantherum* Seithe, Bot. Jahrb. Syst. 81 (1962) 297.

Type species: *S. verbascifolium* auct. non L. = *S. erianthum* D. Don.

The species of this section are large shrubs to small trees. They are unarmed, often densely pubescent with stellate to echinoid hairs. The leaves (often large) are entire and pseudo-stipules are present in some species. The inflorescence is a condensed panicle of cymes. The corolla is stellate and medium-sized. The anthers are oblong, opening by terminal pores, and the ovary pubescent. The berry is globose, succulent or mucilaginous, sometimes pubescent and often yellowish, and the seeds numerous, and pale buff colour.

The centre of speciation of this section of 27 species is in tropical America; two species are now widely distributed in the tropics. It is one of the few sections of the genus for which a recent revision is available, Roe (1972).

*27. *Solanum erianthum* D. Don, Prodr. fl. nepal. (1825) 96.

Lectotype: At K labelled "in Valle Nepalia prope Kalamanda, 1821, Wallich Herb. 2616C", proposed by Roe (1967) 359.

Solanum verbascifolium auct. pl. non L., Sp. Pl. 1 (1753) 184.

For discussion of nomenclature see Roe (1968).

Literature

Due to its conspicuous appearance, wide distribution and weedy proclivity this species has had a great deal published about it. Most of the following references are under the name *S. verbascifolium* L. Brown (1810) 444; Dunal (1813) 165; Dunal (1816) 17; Don (1837) 415; Nees (1837) 46; Walpers (1844) 53; Dunal in DC. (1852) 252; Bentham (1868) 449; Mueller (1868) 145; Bailey & Tenison-Woods (1879-80) 171-172; Mueller (1882) 96; Bailey (1883) 343; Clarke (1883) 230; Hamilton (1887) 289; Moore (1893) 332; Bancroft (1889) 1063; Maiden (1899a) 48; Bailey (1901) 1082; Bailey (1906) 121; Dixon (1906) 221; Cheel (1908) 414, 415; Maiden (1909) 1012; Bailey (1913) 354; Maiden & Betche (1916) 181; Bitter (1917) 490; Hassler (1918a) 115; White (1918) 151; Bitter (1919) 66; Urban (1919) 40; Standley (1924) 1295; Chisholm (1925) 294, 297; Domin. (1929) 1132; Burkill (1935) 2048; Wright (1937) 28; Standley & Morton (1938) 1097; Allman (1939) 54; Hurst (1942) 377; Adelbert (1948) 327-333; Santapu (1948) 653; Webb (1948) 160; Webb (1949) 50; Green (1953) 545; Chaudry *et al.* (1958) 409-410; McBride (1962) 223; Heine (1963) 332; Backer & Bakhuizen (1965) 471; Cabrera (1965) 210; Smith & Downs (1966) 124; Baquar (1967) 388-397; Mitra (1967) 75-80; Krishnappa (1968) 163-173; Roe (1967) 353; Madharadian (1968) 343; Roe (1968) 176-179; Roe (1972) 251; D'Arcy (1973) 717; Gentry & Standley (1974) 116.

Common name: tobacco tree, potato tree.

A shrub or small tree to 4 (-8) m tall, often with a flattened spreading crown, trunk to 20 cm diam., without prickles, all parts densely and softly pubescent with pale stellate hairs (sessile or long multiseriate-stalked, porrect-stellate, with medium to long central ray on leaves; on stems, petioles, calyces, sessile or long multiseriate-stalked, echinoid hairs abundant), general aspect green or grey-green. *Leaves* 10-20 x 5-15 cm, ovate-elliptic, entire, apex acute or acuminate, base rounded or obtuse; petiole 1-10 cm long; axillary leaflets (pseudo-stipules) absent. *Inflorescence* erect, pedunculate, compound cyme borne above leaves, at first terminal but soon lateral, peduncle to first forking 3-5 cm long, pedicels 5-10 mm long. *Calyx* c. 5 mm long including bluntly triangular lobes 2 mm long. *Corolla* about 1.5 cm diam., stellate; lobes about 4 mm broad, white, glabrous inside, pubescent outside. *Filaments* (Fig. 161) about 2 mm long; anther 2.5 mm long, oblong. *Ovary* densely pubescent; style 5-6 mm long, erect, glabrous; stigma terminal, green. *Fruit* (Fig. 156) 1 cm diam., globular, pubescent, dull yellow, succulent when ripe. *Seeds* 1.5-2 mm long. (Fig. 25.)

Chromosome number: $n = 12$ Fedorov (1969) as *S. verbascifolium*.

Notes

Little variation is apparent in this species. The axillary stipule-like leaflets are

invariably absent in *S. erianthum* and, with its white flowers, distinguish it from its close relative *S. mauritianum* which, however, does occasionally have reduced terminal shoots without pseudo-stipules. *S. erianthum* has no close relative in Australian *Solanum*, and is a discordant element in the Australian flora, raising acute problems of phytogeography. Evidence for its establishment before white settlement is strong (e.g. the R. Brown collections from Broad Sound). Introduction from Malesia or the Philippines by fruit pigeons or bats might be possible, but it has not been collected from the north coast of Australia.



Fig. 25. *Solanum erianthum* D. Don. Drawn from field grown plant at the Waite Institute, from J.G. Tracey, collected at Johanson's Caves, Mt Etna, Qld (ADW 42702). $\times \frac{2}{3}$.

Distribution and habitat (Map 8)

Originally from tropical Central America, it is now widespread in south-east Asia and occasional in west tropical Africa. In Australia it is found in the subcoastal areas of eastern Qld and northern N.S.W., generally in disturbed sites at the margins of forest in high rainfall areas.

Selected specimens (total seen about 50)

QUEENSLAND: *Brown* (2663), 1802, Broad Sound (BM, E, K); *Boorman s.n.*, Aug. 1912, Mt. Perry (G, NSW, P).

NEW SOUTH WALES: *Fawcett s.n.*, 1876, Richmond River (NSW); *Stopford s.n.*, 31.vii.1912, St Helena via Byron Bay (BM, NSW).

***28. *Solanum mauritianum* Scop., Delic. Fl. et Faun. Insubr. 3 (1788) 16, t. 8.**

Type citation: "Ex Galliis otinui sub nomine *Solani mauritiani*, lectum a D. Dombey in Insulis Mauritanis. Floruit in Horto Ticinensi decima M. Januarii."

Type material: A type specimen is not known. Roe (1972) 254 proposed the illustration indicated above as iconotype.

Solanum auriculatum Ait., Hort. Kew. 1 (1789) 246.

Type citation: "Nat. of the islands Madagascar Mauritius and Bourbon".

Type specimen: Not seen, Roe (1972) 253 states L'Heritier Herb. G-DC, (microfiche AD!).

Literature

1). as *S. auriculatum* Ait. Dunal (1813) 166; Dunal (1816) 17; Don (1837) 415; Nees (1837) 46; Walpers (1844) 54; Dunal in DC. (1852) 115; Sendtner in Martius (1856) 40; Bailey (1881) 2; Bailey (1883) 343; Woolls (1884-85) 201; Maiden (1895a); Bailey (1901) 1082; Bailey (1906) 121; Maiden (1909) 1012; Bailey (1913) 354; Hamilton (1919) 496; Chisholm (1925) 294, 297; Domin (1929) 1132; White (1933) 95; Wright (1937) 28; Allman (1939) 54; Francis (1939) 444; Francis (1939a) 466; Allan (1940) 196; Hurst (1942) 367; Webb (1948) 158; Winders (1948) 198; Webb (1949) 50; Easterbrook (1950) 271; Connor (1951) 93; Walsh (1956) 331; Everist (1957) 89; Watt and Breyer-Brandwijk (1962) 990; Maiti & Mathew (1967) 126; Madharadian (1968) 343.

2). as *S. mauritianum* Scop. Bitter (1917) 491; Adelbert (1948) 327; Whittet (1958) 358; Lawrence (1960) 34; Beadle, Evans & Carolin (1962) 401; Heine (1963) 332; Backer & Bakhuizen (1965) 471; Roe (1972) 239; Beadle, Evans & Carolin (1972) 487; Everist (1974) 470; Morton (1976) 157.

Common name: wild tobacco tree.

A large *shrub* or small *tree* to 3-4 m high, all parts densely pubescent with tomentum of stellate hairs (sessile to mostly long multiseriate-stalked, porrect-stellate or multiangulate with long central ray, some simple uniseriate multicellular glandular hairs also occur), loose and floccose on young growth. *Leaves* variable depending on vigor of plant, c. 10 x 4 to 30 x 12 cm, elliptic, acuminate; base cuneate, sometimes slightly unequal, pubescence sparser on leaves above, dense below, distinctly paler below; petiole 3-9 cm long; each leaf with 1-2 smaller auricle-like leaflets in axils, these sessile, rounded, but absent on smaller twigs or weak growth. *Inflorescence* a dichotomous, branched corymb with many flowers; peduncle to 15 cm long to first fork; pedicels 2-3 mm long. *Calyx* c. 5 mm long, lobes c. 2 mm long, acute, somewhat enlarged in fruit. *Corolla* 1.5-2.5 cm diam., stellate, violet, close to RHS Sea Lavender Violet 637/1, with a pale 'star' at the base of the corolla. *Filaments* (Fig. 161) 1-2 mm long; anthers 2-3 mm long, oblong. *Ovary* densely pubescent; style 5-7 mm long, pubescent; stigma green. *Fruit* (Fig. 156) 1-1.5 cm diam., globular, pubescent, becoming almost glabrous with age, finally dull yellowish and soft. *Seeds* 150-250 per fruit, 1.5-2 mm wide, light brown in colour, surface finely reticulate under a lens. (Fig. 26.)

Chromosome number: n = 12 Randell & Symon (1976); Roe (1967) 154.

Notes

Many of the earlier references to this species are under the name *S. auriculatum* Ait. Although evidence suggests that the closely related species *S. erianthum* was introduced to Australia before white settlement, the earliest record of this species in Australia is 1883.

The pseudo-stipules in the leaf axils are usually a reliable way of identifying this species, but they may be lacking on distal and depauperate shoots.



Fig. 26. *Solanum mauritianum* Scop. Drawn from field grown plant at the Waite Institute, from seed collected at Waterfall Gully, SA (ADW 32953). $\times \frac{2}{3}$.

Distribution and habitat (Map 3)

Originally from Argentina and southern Brazil this species is now widespread through the tropics. In Australia it is well established as a small weedy tree in disturbed sites in subcoastal areas of eastern Australia and locally in S.A.

Selected specimens (total seen about 50)

QUEENSLAND: *Persieh s.n.*, 1883, Endeavour River (MEL); *Kajewski 1003*, 17.v.1929, Gadgarrah Reserve Pearamon (BRI, K, P).

NEW SOUTH WALES: *Camfield s.n.*, Oct. 1899, Kogarah (NSW); *Constable s.n.*, 2.v.1956, Orara East State Forest, Coffs Harbour (K, NSW).

SOUTH AUSTRALIA: *Cleland s.n.*, 21.vii.1934, Waterfall Gully (AD); *Symon s.n.*, 1966, Waterfall Gully (AD, ADW, CANB).

Section 10. *Pseudocapsica* Roem. & Schult., Syst. Veg. 4 (1819) 569, 584.*Type species: S. pseudocapsicum* L.

The species in this section are shrubs. They are unarmed, glabrate or pubescent with simple or branched hairs (not truly stellate). Leaves are entire, with mostly narrow, ovate shapes. The inflorescence is few-flowered on short peduncles from extra-axillary positions, the corolla stellate, white or mauve; the anthers oblong, opening by terminal pores and lateral slits. The berry is globular, yellow, orange or bright red (erect in our species), the seeds flattened, slightly twisted and pale. The centre of speciation of this small section is in Mexico and South America (D'Arcy, 1973).

*29. *Solanum pseudocapsicum* L., Sp. Pl. 1 (1753) 184.*Type citation*: "Habitat in Madera".

Type material: D'Arcy (1973:714) states "Madeira, Herb. Linn. 248.4 (LINN), not seen, microfiche AD!

Literature

Dunal (1813) 150; Dunal (1816) 11; Don (1837) 411; Walpers (1844) 46; Dunal in DC. (1852) 152; Sendtner in Martius (1856) 32; Bentham (1868) 448; Bailey & Tenison-Woods (1879-80) 171; Bailey (1881) 342; Woolls (1884-85) 201; Maiden (1894) 225; Jackson (1899) 827; Bailey (1901) 1080; Maiden (1909) 1012; Carne (1910) 856; Cabbage (1911) 549; Bailey (1913) 354; Bitter (1917) 497; Hassler (1918) 221; Chisholm (1925) 294, 297; Ewart (1931) 1003; White (1933) 96; Muenscher (1939) 203; Allan (1940) 197; Bor & Raizada (1942) 122-128; Hurst (1942) 373; Webb (1948) 159; Connor (1951) 95; Webb (1952) 94; Whittet (1958) 359; Lawrence (1960) 34; Beadle, Evans & Carolin (1962) 401; McBride (1962) 215; Watt & Breyer-Brandwijk (1962) 1001; Bezbaruah (1963) 198; Kingsbury (1964) 292; Cabrera (1965) 210; Baquar (1967) 388-397; Curtis (1967) 506; Madharadian (1968) 343; Willis (1972) 550; Beadle, Evans & Carolin (1972) 488; Verbist *et al.* (1972) 25-31; D'Arcy (1973) 714; D'Arcy (1974) 855; Everist (1974) 474; Beal *et al.* (1976) 415, Morton (1976) 165.

Common names: winter cherry, Jerusalem cherry, Madeira cherry.

A shrub 1-2 m tall, green, often with somewhat erect branches, glabrous or with sparse tomentum of varied hairs (minute simple uniseriate multicellular, minute simple glandular and multicellular dendritic) mainly on twigs or young growth, later glabrescent, general aspect concolorous. *Leaves* c. 5-8 x 1-1.5 cm, elliptic, acute or acuminate, margins slightly undulate, veins prominent below, blade cuneate along most of petiole; petiole 1-1.5 cm long. *Inflorescence* of solitary or few flowers on short common peduncle 5-10 mm long, from an internode; pedicel c. 1 cm long, at first deflexed, later erect in fruit. *Calyx* tube c. 2 mm long; lobes 2-3 mm long, triangular. *Corolla* 1 cm diam., stellate, white. *Filaments* (Fig. 161) very short; anthers 2 mm long, thick in relation to length, with apical pores. *Style* erect, projecting 1-2 mm beyond anthers. *Fruit* (Fig. 150) 1-1.5 cm diam, globular, often solitary on peduncle 1 cm long, bright orange-red (close to RHS Capsicum Red 715) when ripe, fleshy and succulent; calyx lobes not much enlarged, covering base of berry. *Seeds* about 50 per fruit, flat, 3 mm diam., pale buff or yellow, with thickened margin slightly deeper in colour, surface minutely granular. (Fig. 27.)

Chromosome number: $n = 12$ Randell & Symon (1976).

Notes

This species is commonly grown as the decorative shrub "winter cherry". It has become naturalised and weedy in eastern Australia but in none of the earlier collections is it clear whether the plants are naturalised or collected from gardens. It has also been misidentified as *S. capsicastrum* Link ex Schauer (of which the correct name may be *S. diflorum* Vell.) and reported by White (1942) 224, to be naturalised in Qld, e.g. Hubbard 4299 from near Mudgeeraba railway station.



Fig. 27. *Solanum pseudocapsicum* L. Drawn from a plant spontaneous in a garden, Tusmore, SA (ADW 43660), $\times \frac{2}{3}$.

Distribution and habitat (Map 14)

All States with the possible exception of the N.T., either in cultivation or naturalised in mesic sites in disturbed scrub.

Selected specimens (total seen about 80)

QUEENSLAND: *Campbell s.n.*, 11.vi.1885, Blackall (BRI); *Kajewski 1266*, 2.x.1929, Boonjie (BRI, E, K, P).

NEW SOUTH WALES: *Beckler s.n.* 1868, Hastings River (K, MEL, NSW); *Constable s.n.*, 1.v.1957, Thirroul (NE, K, NSW).

VICTORIA: *Morrison s.n.*, 16.iii.1871, Melbourne (E); *Beaulehole 32963*, 30.xii.1969, Mallacoota Inlet (acb, ADW, MEL).

SOUTH AUSTRALIA: *Ising s.n.*, undated, Payneham, (AD); May 1961, Magill (ADW).

WESTERN AUSTRALIA: *Merrall s.n.*, 1888, Upper Swan River (MEL); *Sachse s.n.*, 1968, Bencubbin (PERTH).

Section 11. *Pugiunculifera* Symon, sect. nov.

Herba annua, aculeata, glabra; folia lobata; corolla campanulata; bacca viridis vel purpurascens; semina tenua, plana, papyracea.

Typus: S. pugiunculiferum C.T. White.

Annual, prickly, glabrous; leaves lobed; corolla campanulate; anthers oblong, opening by terminal pores; berry firm-fleshed, dryish, green or flushed purple; seeds thin, flat, papery. See note below *S. pugiunculiferum*.

30. *Solanum pugiunculiferum* C.T. White, Proc. Roy. Soc. Queensland 53 (1942) 225.

Type citation: "Burke District, - Settlement Creek, *L.J. Brass*, No. 244 (flowers and young fruits), Nov., 1922 (subshrub 1-2 ft. high). Burketown, near the old meat works, *P.G. Higgins* (fruits), 26th May, 1919".

Holotype: *Brass 244*, indicated by White on his label (BRI 10422, isotype K).

An erect or spreading annual *herb* to 0.5 m high; prickles to 1.5 cm long, stout, straight and pale-coloured, scattered on stems, upper and lower leaf surfaces, peduncles and calyx; plant glabrous except for minute, yellowish, glandular hairs on young growing tips, general aspect grey green, leaves concolorous. *Leaves* (3-) 5 (-7) x (2.5-) 3 (-5) cm, ovate, with 5-7 long triangular lobes, lobes 0.5-2 cm long; sinuses cut three quarters to midvein, broad and rounded; leaf and lobe apex acute or acuminate; leaf base truncate to cuneate, very oblique; petiole 1-2 cm long. *Inflorescence* a short cyme of 3-6 flowers from extra-axillary position; peduncle 0-5 mm long; pedicel c. 5 mm long. *Calyx* tube 2 mm long; lobes 1 mm long, triangular; acumen scarcely developed; calyx lobe or calyx tube on outer side of each cluster of flowers frequently with 1-2 large prickles, inner ones without prickles. *Corolla* c. 1 cm diam., campanulate; lobes broad and rounded, folded inwards to give stellate-campanulate appearance, pale lavender. *Filaments* (Fig. 161) 1.5-2 mm long; anthers 1.5-2 mm long, oblong. *Ovary* glabrous; style 3 mm long, erect, stigma terminal, pale. *Fruiting* pedicels deflexed; calyx scarcely enlarged, appressed or reflexed; *fruit* (Fig. 151) 1 cm diam., depressed globular, greenish or flushed purple, not succulent, finally light brown and papery. *Seeds* 3-3.5 mm long, light brown, minutely reticulate, rather thin and papery, (30-) 45 (-57) counted in 10 fruits cultivated. Cotyledons almost linear. (Fig. 28.)

Chromosome number: $n = 12$ Randell & Symon (1976) and, in addition, *Symon 4706*.

Note

This distinctive species has no close relative amongst Australian *Solanum*, nor have I seen material of exotic species which approach it. The apparently annual habit, striking,

large, straw-coloured prickles, absence of stellate hairs, campanulate corolla, short anthers and papery seeds are substantial differences from any other species. Because of this it has been given sectional status on its own. It is rather odd that there are no collections made earlier than 1919 which could perhaps suggest it is a lately arrived alien. However, the plant does not appear to be common, it is very prickly and has a restricted habitat. Although its biology is not well known it is possibly a tumble weed. The fruits are never succulent, nor attractive, and when finally dry have a brittle parchment-like texture; the thin flat seeds may be distributed by the uprooted plants rolling along.



Fig. 28. *Solanum pugiunculiferum* C.T. White. Drawn from pot grown plant at the Waite Institute, from seed from Chippendale 5064, collected at Red Lily Lagoon, 13 km east of Elsey Stn, NT (ADW 42145). $\times \frac{2}{3}$.

Distribution and habitat (Map 8)

N.T. and north western Qld. It grows on heavy soils on the margins of seasonally flooded flats and lagoons.

Specimens examined

NORTHERN TERRITORY: *Chippendale* 5064, 15.x.1958, E of Elsey Stn (AD, ADW, BRI, CANB, MEL, NSW, NT); *Letts s.n.*, 27.x.1961, Elsie Stn (ADW); *Symon* 4706, 10.iii.1967, grown from *Chippendale* 5064 (ADW, BRI, CANB, K, NT); *Hutchinson*, 1968, Keep River (PERTH); *Symon* 4998 1.vi.1967.

QUEENSLAND: *Higgins s.n.* 1919, Burketown (BRI, K); *Brass* 244, Nov 1922, Lower Settlement Creek (CANB); *Barlow* 322, 18.viii.1961, SE of Normanton (ADW, BRIU); *Pedley* 2103, 1966, Karumba (BRI, NSW); *Symon* 4998, 1.vi.1967, SE of Burketown (AD, ADW, BRI, CANB, NSW). *Symon* 5000, 1.vi.1967, SE of Burketown (AD, ADW, BRI, CANB, NSW).

Section 12. *Acanthophora* Dunal, Hist. nat. *Solanum* (1813) 131, 218.

Lectotype species: *S. mammosum* L. (D'Arcy, 1972: 275).

The species of this section are herbs or shrubs; they are copiously armed with acutely sharp prickles and pubescent with apparently simple hairs (reduced stellate hairs) or with small stellate hairs. The leaves, ovate shapes, are deeply or shallowly lobed. The inflorescence is a condensed, few-flowered, unbranched cyme, the corolla is deeply stellate, the anthers lanceolate, often pale yellow, and opening by small terminal pores. The berry is yellowish to vermilion or blackish, firm-fleshed, dryish, sometimes with crisp, white mesocarp; the seeds are variable, and in some species flattened and with a narrow wing.

The centre of speciation of this section is in tropical Central and South America. Both our species have been cultivated as ornamentals and *S. capsicoides* is widely established as a pantropical weed. The species are not closely related to any Australian species.

*31. *Solanum capsicoides* All., Melanges philos. -mat. Soc. Roy. Turin (1773) 12.

Type collection: Cultivated at Turin "semina ad me missa hoc anno fuerunt a Cl. Guatteri Parmensi bot. Prof. sub nomine solani capsicoidis ex h. Patavino." For information on the use of this name see Dandy (1970).

Type material: Possibly Turin (TO). Not seen.

Solanum aculeatissimum Jacq., Collect. 1 (1787) 100; Icon. Pl. Rar. 1 (1786) 41.

Type citation: No precise citation given. "Patria in zona torrida est."

Type material: D'Arcy (1973:711) states that the type is "Jacquin s.n. (W)", not seen.

Solanum ciliatum Lamk., Tab. Encycl. Supp. 2 (1794) 24.

Type citation: A cultivated plant in Herb. Lamarck.

Type material: A sheet at P. LA bears the label "*Solanum ciliatum* Lamk, illustr. Dic. No. 55". *Solanum* (mammosum erased) *capsicoides*". Photo ADW.

Literature:

Dunal (1813) 219; Poirlet (1814) 743; Dunal (1816) 41; Don (1837) 434; Walpers (1844) 85; Dunal (1852) 244; Sendtner (1856) 59; Bailey (1881) 3; Bailey (1883) 346; Clarke (1883) 237; Baker (1897) 234; Bailey (1901) 1088; Bailey (1906) 123; Maiden (1909) 1012; Bailey (1913) 357; White (1918) 151; Bitter (1923) 148; Standley (1924) 1299; Burkill (1935) 2042; Hurst (1942) 367; Webb (1948) 157; Lawrence (1960) 28; Watt & Breyer-Brandwijk (1962) 990; Heine (1963) 334; Arora & Sen Gupta (1964) 95; Kingsbury (1964) 289; Backer & Bakhuizen (1965) 472, 474; Smith & Downs (1966) 148; Madhavadian (1968) 343; D'Arcy (1974) 842; Everist (1974) 466; Heine (1976) 164; Morton (1976) 199.

Common name: devil's apple.

An annual or short lived perennial *shrub* to 1 m high, stems, petioles, upper and lower leaf surfaces, pedicels and calyces bearing scattered, extremely sharp, pale or straw coloured prickles to 12 mm long; sparsely pilose with simple, uniseriate, few-celled hairs (stellate hairs absent) and minute, simple, glandular hairs. *Leaves* broadly ovate, to

15 x 15 cm but usually less, with 5-7 lobes, sinuses reaching about half way or less to midrib, lobe and leaf apex acute or obtuse, major lobes may be slightly repand but scarcely lobed, general aspect green. *Flowers* 2-3 together on a short peduncle 3-4 mm long, or pedicellate on stem in internodal position; pedicel 1-1.5 cm long at anthesis. *Calyx* tube 2-3 mm long; lobes 2-3 mm long, broad-lanceolate, acute. *Corolla* 2-3 cm diam., deeply stellate, lobes c. 1 cm long, glabrous inside and out, white. *Filaments* (Fig. 161) 1-2 mm long, glabrous; anthers 5-7 mm long, tapered upwards, erect in a cone, pale yellow. *Ovary* with some glandular hairs; style 5-8 mm long, erect, pale; stigma green.



Fig. 29. *Solanum capsicoides* All. Drawn from pot grown plant at the Waite Institute, from seed from Dockrill & Stevens 372, collected from State Forest Reserve 185, Edith L.A., 17° 10'S, 145° 35'E, Qld (ADW 43249). $\times \frac{2}{3}$.

Fruit (Fig. 151) c. 2-3.5 cm diam., slightly depressed-globular, bright orange-scarlet when mature, flesh white, sweetish and not bitter, dryish when ripe. Four fruits had an average of 425 seeds in each. *Seeds* 4-5 mm diam., flat, the area over embryo pale light-brown, bordered by a distinct pale wing about 1.5 mm wide, all minutely pitted. *Cotyledons* broadly ovate-lanceolate, c. 13 x 7 mm, first true leaves almost orbicular, petioles without prickles, later leaves increasingly lobed. (Fig. 29.)

Chromosome number: $n = 12$ Randell & Symon (1976).

Notes

This species has been grown for its attractive fruits, as an ornamental, which may account for its establishment in Australia. Although many solanums are unpleasant to handle, the prickles on this species seem particularly sharp.

Authors do not agree on whether *S. ciliatum* and *S. aculeatissimum* are conspecific or whether two species are involved. The Australian material agrees with the description given by D'Arcy (1974) for *S. ciliatum*. It certainly has orange-red fruit and winged seeds.

Distribution and habitat (Map 9)

Originally from tropical Central America this species is now widely naturalised in other tropical areas. In Australia it is established in high rainfall, sub-coastal, northern N.S.W. and eastern Qld. It is most commonly collected from disturbed sites in clearings, along creeklines and forest margins.

Selected specimens (total seen about 30)

QUEENSLAND: *Sims s.n.*, 1875, Ironbark Ranges (BRI); *Moriarty 1585*, 25.ix.1974, Mt Bartle Frere (ADW, CANB, MO).

NEW SOUTH WALES: *Anon s.n.*, Apl. 1876, Tweed River district (NSW); *Johnson & Constable s.n.*, 12.vi.1957, Brunswick River (NSW).

*32. *Solanum mammosum* L., Sp. Pl. 1 (1753) 187

Type citation: "Habitat in Virginia, Barbados".

Type material: Herb. Linn., LINN 248.32; microfiche AD.

Literature

Hurst (1942) 371; Lawrence (1960) 20-35; McBride (1962) 255; Smith & Downs (1966) 153; Miller (1969) 230; Heiser (1971) 59; Martin (1972) 127; D'Arcy (1973) 712; D'Arcy (1974) 851; Gentry & Standley (1974) 126; Morton (1976) 201, Telek *et al.* (1977) 120.

Common name: nipple fruit.

An annual or short-lived *shrub*, 1-2 m, hirsute with simple or occasionally stellate hairs; prickles sparse, 1-1.5 cm long, on leaves and stems, straw-coloured, mostly straight. *Leaves* 12-15 x 12-15 cm, orbicular or broad-ovate, with 5-7 main lobes each of which may be slightly lobed, main lobes broadly triangular, apices acute; sinuses rounded, not deeply cut; petioles 6-10 cm long. *Inflorescence* a 1-4-flowered almost sessile cyme; pedicels 8-10 mm long. *Calyx* tube 2 mm long, lobes subulate-acuminate 3-4 mm long. *Corolla* 3-4 cm diam., deeply stellate, pale purple-blue, tube very short; lobes 2 x 0.4 cm, linear-lanceolate, hirsute outside, glabrous within. *Filaments* (Fig. 161) 1 mm long; anthers 7-8 mm long, attenuate. *Ovary*, style and stigma not seen. *Fruits* (Fig. 150) large, 3-6 cm long, yellow or orange, with nipple-like apex and basal outgrowths, pulp white. *Seeds* purple-red, punctate. (Figs 30 & 31.)

Chromosome number: $n = 11$, 12 Heiser (1971).

Note

S. mammosum is occasionally cultivated as an ornamental for its bizarre fruit. These have probably been selected from a teratological abnormality and evidence suggests

that the wild types had simple globular fruit. Gentry and Standley (1974) describe its use as a fetish in Guatamala.

Distribution

Occasionally grown as an ornamental in Australia, not known to be naturalised.



Fig. 30. *Solanum mammosum* L. Drawn from plant collected at Zenag, Morobe District, Papua New Guinea (ADW 44578). $\times 2/3$.

Selected specimen (total seen about 5)

SOUTH AUSTRALIA: *Symon s.n.*, 17.iii.1972, cult. Adelaide (ADW, BRI, CANB).

WESTERN AUSTRALIA: *Entermann s.n.*, 1964, South Perth (PERTH).



Fig. 31. *Solanum mammosum* L. Leaf and fruit from same plant as illustrated in Fig. 30. $\times \frac{2}{3}$.

Section 13. **Lasiocarpum** (Dunal) D'Arcy, Ann. Missouri Bot. Gard. 59 (1972) 270.

Basionym: *Lasiocarpa* grad. ambig., Dunal, in DC., Prodr. 13 (1852) 30, 252.

Type species: *S. lasiocarpum* Dunal.

The species of this section are small to large shrubs or small trees. They are armed, and pubescent with stellate or reduced-stellate hairs sometimes glandular. The leaves (often large) are deeply or shallowly lobed, sometimes suffused with purple. The inflorescence is a short, congested unbranched cyme with several hermaphrodite flowers below and a few males above. The corolla is stellate (often white) the anthers lanceolate and opening by terminal pores. The ovary is densely pubescent, the calyx somewhat enlarged in fruit, and the berry succulent, usually yellow to orange, pubescent, with the seeds pale buff.

The centre of speciation of the section is in tropical America. The one species attributed to Asia may be a very early introduction from the Americas which has now diverged from its ancestral stock.

*33. **Solanum ferox** L., Sp. Pl. ed. 2, 1 (1762) 267.

Type citation: "Habitat in Malabar" (Madras area India).

Type material: Herb. Linn., LINN; Microfiche AD.

Literature

Bitter (1919) 80; Backer & Bakhuizen (1965) 473.

A shrub 2 (-3) m tall, stems relatively thick, woody below, prickles to 6 mm long, straight or slightly recurved, abundant on stem, petiole, upper and lower leaf surface, (Bitter (1919) reports forms without prickles); all parts densely hirsute-villous with stellate hairs (long or short multiseriate-stalked, porrect-stellate, with long to very long central ray, often glandular); general aspect yellowish or rusty-green. *Leaves* markedly discolorous, often paired at nodes; juvenile leaves to 30 x 30 cm, broadly ovate, c. 6 major lobes on each side, sinuses shallow, rounded and barely cut $\frac{1}{5}$ of way to midrib, lobe apices acute; adult leaves to 18 x 15 cm, ovate to ovate-elliptic, with 4-6 short, broadly triangular lobes on each side, with smaller secondary lobes or teeth, sinuses shallow and rounded, rarely cut $\frac{1}{5}$ of way to midrib, leaf and lobe apices acute, base truncate, rounded to cordate; petiole 5-8 cm long; when paired smaller leaf c. $\frac{2}{3}$ the size of the larger. *Inflorescence* of (1) 2-6-flowered, densely hairy cymes; peduncle very short; floral rhachis short; pedicel 5-10 mm long. *Calyx* 6-8 mm long, broadly campanulate; lobes short, broadly triangular, apex acute. *Corolla* to 4 cm diam., stellate, white, densely hairy outside. *Filaments* (Fig. 161) very short or anthers sessile; anthers to 8 mm long, broadly lanceolate, erect but the group slightly deflexed. *Ovary* to 4 mm long, somewhat conical, densely pubescent; style 5-7 mm long, erect, pale, glabrous; stigma capitate, small. *Fruit* (Fig. 151) 1.5-3.0 cm diam., solitary or in clusters of 2-3, globose, densely pubescent with stellate hairs having a long central ray, yellowish, calyx slightly enlarged to cover base of fruit. *Seeds* 2-2.5 mm long, flat, slightly notched, pale yellow. *Cotyledons* lanceolate, 10-15 x 5 mm; first leaf broad-ovate, 1-1.5 x 1 cm. (Fig. 32.)

Chromosome number: $n = 12$ Fedorov (1969)

Note

S. ferox is one of the most recent *Solanum* records in Australia. It could be a recent introduction but as the north of Cape York has not been well collected it is difficult to be sure of this point. The section to which it belongs is tropical American in origin and *S. ferox* is phytogeographically an anomalous species in the flora of south east Asia. The species has no close relative amongst Australian *Solanum*. It is possible that it was an early introduction by the Spaniards and Portuguese from Central America, like

S. erianthum and *S. mauritianum*, and that some divergence of populations has now taken place. *S. ferox* does appear to be closely related to *S. flavescens* Dunal which is found in tropical Mexico and Guatemala, but to date *S. ferox* has not been recorded from the Americas, nor placed in synonymy with American species.

Insufficient material has been seen to comment on variation in this species. It occurs in New Guinea and Malesia, and Bitter (1919) describes several variants including forms without prickles.



Fig. 32. *Solanum ferox* L. Drawn from pot grown plant, from seed from Webb & Tracey 10974, collected at Lockerbie, Bamago, Cape York, Qld (ADW 51416; fruits from original collection, ADW 47016). $\times 2/3$.

Distribution and habitat (Map 21)

Queensland on Cape York in the vicinity of Weipa. The only collections have come from a forest opening on basaltic soil, where trees had fallen.

Specimens examined (all cited)

QUEENSLAND: *Webb & Tracey 10974*, 20.ix.1974, Lockerbie, Bamaga, Cape York Peninsula. Semi-evergreen vine forest on latosols derived from basic volcanics. Shrub to 2 m growing in openings in forest where trees have fallen (ADW, BRI, CANB). (Cuttings taken from this collection have been grown at CSIRO Long Pocket Laboratories, Indooroopilly, Queensland, and fruiting specimens distributed); *Hyland 9988*, 8.ix.1979, Lockerbie, rainforest, very prickly shrub to 1 m growing on snig tracks, flowers white (QRS).

Section 14. *Androcera* (Nutt.) Bitt. ex Marzell in Hegi, Fl. Mitt.-Eur. 5 (1927) 2585.

Androcera Nutt., Gen. Amer. (1818) 129, basionym (as a genus).

Type species: Androcera lobata Nutt. = *S. rostratum* Dunal

The 12 species of this small section are annuals or rarely herbaceous perennials. They are copiously armed with prickles and pubescent with stellate hairs or sometimes glandular. The leaves, of chiefly ovate shapes, are deeply lobed. The inflorescence is an erect, unbranched cyme. The corolla is regular or zygomorphic the two lower petals enlarged and outcurved, yellow, blue or white and the anthers heteromorphic, sometimes one much larger than the others, and differently coloured, lanceolate, and opening by small terminal pores. The berry, often dark-brown, is substantially enclosed in a very prickly calyx, and is dryish, subcapsular, and the seeds often dark grey to black.

The centre of speciation of the section is in arid, southern North America, Whalen (1976, 1979). One species (*S. rostratum*) is now widespread as a weed.

*34. *Solanum rostratum* Dunal, Hist. nat. *Solanum* (1813) 234, t. 24.

Type citation: "in horto Monspeliensi cultum"

Type material: Not seen. D'Arcy (1974) gives G, G-DC, MPU, P.

Solanum heterandrum Pursh, Fl. Amer. Sept. 1 (1813) 156, tab. 7.

Type: Missouri River, 1811, *Nuttall s.n.* [PH, G-DC] cited by Whalen (1979). Not seen.

Literature

Because of its weedy nature there is an extensive literature published on this species.

Dunal (1813) 234; Dunal in Poiret (1814) 776; Dunal (1816) 46; Don (1837) 438; Walpers (1844) 91; Dunal in DC. (1852) 329; Ascherson (1894) 43-45; Maiden (1904) 246, 316, 541; Sloane (1905) 101; Bailey (1906) 123; Bailey (1906a) 365 (as *barbisetum*); Bailey (1906b) 410; Ewart (1908) 194 as *heterandrum*; Maiden (1909) 1012; Pammel (1911); Bailey (1913) 357; Black (1917) 50; Osborne (1917) 783; Ewart (1918) 176 as *heterandrum*; Maiden (1918) 235; Maiden (1920) 74; Black (1921) 18; Anon (1924) 1032; Blakely (1924) 347; Gardner (1924-25) 69; Osborne (1924) 1033; Black (1926) 499; Ewart (1931) 1002; Allan (1934) 295; Clarke (1935) 1220; Muenscher (1935) 414; Sampson & Malmsten (1935); Muenscher (1939) 205; Hurst (1942) 374; Webb (1948) 159; Clarke (1949) 87; Connor (1951) 96; Richardson (1953) 449; Podjarkova (1955) 41; O'Neil (1958) 7-11; Whittet (1958) 360; Watt & Breyer-Brandwijk (1962) 1005; Davis & Wiese (1964) 367; Kingsbury (1964) 292; Pafford & Weise (1964) 365; Ooststroom & Reichgelt (1966) 168; Sperry (1966) 16-17; Davis, Johnson & Wood (1967) 555; Singh & Bagnall (1968) 335; Ristich (1971) 397; Willis (1972) 553; Parsons (1973) 271-273; D'Arcy (1974) 858; Everist (1974) 476; Bowers (1975) 633; Grieve & Blackall (1975) 601; Lamp & Collet (1976) 300; Whalen (1976) 228; Whalen (1979) 359.

Common name: buffalo burr.

A weedy annual *herb* to c. 1 m high, commonly much less, branching freely and flowering when quite young. Very prickly on stems, petioles, leaves, peduncles and especially on calyx, prickles variable in length, to 1 cm long, glabrous, straight, pale or straw-coloured; all parts pubescent with pale stellate hairs (sessile or short multiseriate and stalked, porrect-stellate hairs with long central ray) and minute, simple, glandular hairs, general aspect green or grey-green, concolorous. *Leaves* 2-10 x 1-8 cm, variable

depending on the stage of growth, ovate or ovate-oblong, deeply lobed or pinnately parted with 5-7 principal lobes, lamina cut to midrib between lower lobes, sinuses rounded, individual lobes almost obovate, with irregular, sinuate, sub-crenate margins; petiole to 5 cm long, continuing as raised decurrent lines down stem. *Inflorescence* a cyme of few to 10 flowers, in an extra-axillary position; peduncle 2-3 cm long, fertile portion to 6 cm long; pedicels 1 cm long, erect. *Calyx* tube at anthesis 3-4 mm long, lobes 3-5 mm long, subulate, later accrescent. *Corolla* 3-4 cm diam., irregularly rotate, 1-2 lobes often longer than the rest, bright yellow. *Anthers* unequal; 4 anthers 6-8 mm long on filaments



Fig. 33. *Solanum rostratum* Dunal. Drawn from herbarium specimen, Symon 8509, from between Auburn and Mintaro, SA (ADW 42305). $\times \frac{2}{3}$.

1-2 mm long; 1 anther 10 mm long, rostrate, purplish-brown-yellow; *style* slender, curved, as long as the large anther; *stigma* unexpanded. *Fruit* (Fig. 150) 1 cm diam., globular, enclosed in very prickly calyx, fruit and calyx ultimately papery and dry. *Seeds* c. 2 mm wide, dark or black, with minute deep pits visible under a lens. Pot grown plants had (5-) 12 (-20) seed per fruit but this number may be low. (Fig. 33.)

Chromosome number: $n = 12$ Randell & Symon (1976).

Notes

Although listed as a noxious weed in several States, it does not appear to be a serious pest. It has a slight reputation as a poisonous plant but no doubt the prickles prevent much material from being eaten. It is the only yellow flowered *Solanum* naturalised in Australia. The small section to which this species belongs is distinctive and has no close relatives in Australia.

Distribution and habitat (Map 5)

Found in disturbed sites mainly in the cereal growing areas. Erratic in its occurrence and abundance and probably requiring summer rains at least in the southern States.

Selected specimens (total seen about 60)

QUEENSLAND: *G. F. B.*, 30.i.1906, Gatton (BRI); *Sperling s.n.*, Nov. 1961, Jandowae (BRI).

NEW SOUTH WALES: *Donaldson s.n.*, Jan. 1904, Boggabri (NSW); *Black s.n.*, Jan. 1963, Wyalong (NSW).

VICTORIA: *Lindsay s.n.*, June 1906, Taminick (MEL); *Cain s.n.*, 20.iii.1909, Echuca (MEL, NSW).

SOUTH AUSTRALIA: *Osborne s.n.*, Mar. 1917, Bute (AD, MEL); *Symon 8509*, 27.iii.1973, between Auburn and Mintaro (AAU, ADW, CANB, DAV, K, L, MO).

WESTERN AUSTRALIA: *Bell s.n.*, Feb. 1907, Woodanilling (NSW); *Johnson s.n.*, 30.iii.1955, Wickepin (PERTH).

Section 15. *Cryptocarpum* Dunal, Hist. nat. *Solanum* (1813) 134, 232.

Lectotype species: *S. balbisii* Dunal, (? = *S. sisymbriifolium* Lamk.), D'Arcy (1972:275).

The species of this small section are annuals or soft-wooded shrubs. They are copiously armed and are pubescent with stellate hairs often very glandular. The leaves, having ovate shapes, are deeply lobed. The inflorescence is an unbranched cyme, the lower flowers are hermaphrodite and some upper flowers may be male. The corolla is rotate or shallowly lobed, the anthers lanceolate, opening by small terminal pores, and the ovary and style sparsely glandular hairy. The fruit is partially enclosed in the accrescent calyx but exposed when ripe, and is bright red (*S. sisymbriifolium*), succulent.

The centre of speciation for this section is in South America. Our species has been widely cultivated as an ornamental and is occasionally naturalised. Seithe (1962) includes the Australian species *S. campanulatum* R. Br. in this section but I consider it differs in many details and the densely glandular tomentum is the only character in common.

*35. *Solanum sisymbriifolium* Lamk., Tabl. Encyl. Meth. Bot. 2 (1799) 25.

Type citation: "Ex agro Bonariense, Commers. herb."

Type material: Herb. P-LA, photo ADW, D'Arcy (1974) also give MPU.

Solanum balbisii Dunal, Hist. nat. *Solanum* (1813) 252, t. 3. Superfluous renaming of *S. decurrens* Balb. and hence illegitimate.

Literature

Dunal (1813) 232; Sims (1825) t. 2568 as *balbisii*; Jackson (1828) t. 2828 as *balbisii*; Jackson (1842) t. 3954 as *balbisii*; Walpers (1844) 91 as *balbisii*; Dunal in DC. (1852) 326; Sendtner in Martius (1856) 76; Bitter (1917a) 7-12;

Gardner (1924-25) 69 as *S. aculeatissimum*; Vilmorin & Simonet (1927) 164; Alexander (1940) 27-28; Ratera (1940) 1-7; Rioux & Quezel (1947) 110; McBride (1962) 262; Patino (1962) 276; Schultes & Romero-Castaneda (1962) 276; Watt & Breyer-Brandwijk (1962) 1005; Backer & Bakhuizen (1965) 472; Cabrera (1965) 202; Ooststroom & Reichgelt (1966) 166; Smith & Downs (1966) 183; Mason (1967) 268; Krishnappa (1968) 163; Madharadian (1968) 343; Ristich (1971) 397; D'Arcy (1974) 859; Everist (1974) 477; Morley (1975) 144; Grieve & Blackall (1975) 602; Morton (1976) 194.



Fig. 34. *Solanum sisymbriifolium* Lamk. Drawn from herbarium specimen, ADW 31487, grown at the Waite Institute from seed from the Royal Botanic Gardens, Kew. $\times \frac{2}{3}$.

An annual or short-lived, erect, viscid perennial *herb* to 1.5 m high; stems, petioles, upper and lower leaf surfaces, peduncles and calyces bearing abundant prickles 1-10 mm long, yellow or reddish, acicular or flattened at base; all parts pubescent, with tomentum of glandular and stellate hairs (sessile porrect-stellate with glandular long central ray, simple uniseriate multicellular glandular hairs and minute simple glandular hairs); general aspect glandular and green, concolorous. *Leaves* to 14 x 10 cm, usually less, green, ovate-lanceolate, pinnately parted and lobed, lower lobes cut to midrib, a petiolule present, or less deeply cut and lamina continuing along main vein, 7-13 lobes on well developed leaves, lobe apex and leaf tip acute, major lobes lobed, some almost to midrib. *Inflorescence* a cyme, rhachis to 15 cm long, bearing to 12 flowers; pedicel 1-1.5 cm long. *Calyx* deeply lobed, tube 3-4 mm long; lobes 5-7 mm long, lanceolate. *Corolla* to 5 cm diam., rotate-stellate; lobes 7-10 mm long, with scattered stellate hairs on outside and especially along main veins, glabrous inside, white or very pale blue. *Filaments* (Fig. 161) 2 mm long, glabrous; anthers 10 mm long, linear or slightly tapered, bright yellow. *Ovary* with few glandular hairs; style 10-12 mm long, glabrous. Fruiting pedicel 2 cm long; calyx enlarged, partially covering fruit, *fruit* (Fig. 151) 1.5-2 cm diam., bright shiny red, succulent when ripe, usually only lower flowers setting fruit. *Seeds* 2 mm diam., biconvex, pale buff or whitish when cleaned, uniformly, minutely pitted all over, about 100 per fruit (average of 20 fruit) ten largest averaging 140 seeds per fruit. *Cotyledons* lanceolate, first true leaf broadly ovate, unlobed, second leaf with basal lobes well developed. (Fig. 34.)

Chromosome number: $n = 12$ Randell & Symon (1976).

Notes

Plants grown outside at the Waite Institute had flowers that were quite white in summer and pale blue in winter. Although established at Bayswater, Perth, for 70 years it does not appear to have spread. The collections from Toowoomba, Qld, however, suggest that the plant is spreading there.

The specimens at Brisbane were identified by C.T. White as *S. sisymbriifolium* Lamk. var. *heracleifolium* Sendtn. in Martius, Fl. Brazil. 10 (1848) 76; however, Morton (1976) states that this varietal name is illegitimate. He maintains var. *macrocarpum* Kuntze for exceptionally hairy, coarse leafed, large fruited forms from southern Brazil and Argentina, but these characters do not apply to specimens collected in Australia.

Distribution and habitat (Map 12)

Originally from warm temperate South America, it has been widely cultivated as an ornamental and is occasionally eaten, Patino (1962). The species has become established as a weed in the tropics and is locally naturalised in Qld, N.S.W. and W.A.

Selected specimens (total seen about 17)

QUEENSLAND: *Leslie s.n.*, 10.i.1921, Toowoomba (BRI); *Everist* 7772, 23.x.1964, Toowoomba (BRI).

NEW SOUTH WALES: *Smith s.n.*, Oct. 1972, Gulargambone (ADW, NSW); *Briggs* 4480, 9.ii.1972, Rydalmere (ADW, NSW).

WESTERN AUSTRALIA: *Morrison s.n.*, 24.xi.1898, Bayswater (BM, E); *Graham s.n.*, 24.ii.1955, Bayswater (PERTH).

Section 16. *Torva* Nees, Trans. Linn. Soc. London 17 (1834) 51.

Type species: *S. torvum* Sw.

The species of this section are large shrubs or small trees. They are well armed with prickles, and are pubescent with stellate hairs. The leaves (often large) are entire or deeply lobed. The inflorescence is usually many-flowered, the peduncle branched several times and the individual cymes short. The corolla is stellate (often white), the anthers lanceolate, opening by terminal pores, and the distal flowers may be male. The fruit is globose, yellowish, firm and mucilaginous.

The centre of speciation of this section is in tropical Central America, but several species are now widespread as weeds, (*S. torvum* pantropical). D'Arcy (1973) has included the two species listed here in his account of section *Melongena*.

Several series were named by Bitter, Bot. Jahrb. Syst. 57 (1921) 250, and include series *Eutorvum* Bitt. l.c. 251, which included *S. hispidum* and *S. torvum* and series *Giganteiformia* Bitt. l.c. 255, which included *S. giganteum* and several other African species. The latter series differs from *Eutorvum* in the following ways. (*Eutorvum* in brackets); leaves entire or subrepand (leaves mostly lobed); all flowers fertile (distal flowers male); corolla stellate, nutant, violet (corolla rotate-stellate, erect or outfacing, white); anthers 3.5-4.5 mm (6-8 mm); berry 8-11 mm diam. (10-15 mm), red to blackish (yellowish). The African species differ in so many ways that I do not consider *S. giganteum* and its related species should be included in the section *Torva*.

***36. *Solanum hispidum* Pers., Syn. Pl. 1 (1805) 228.**

Type citation: "In Peruviae ruderalis", and based on *S. stellatum* Ruiz & Pavon, Fl. Peru 2 (1799) 40, tab. 176, fig. b, non Jacq., Coll. 3 (1789) 254, tab. 5, fig. 2.

Type material: Huanuco: Panao & Pillao, Ruiz & Pavon, fide McBride (1962) 252. Not seen, possibly at MA.

Literature

Dunal (1813) 204; Poiret (1814) 770; Dunal (1816) 37; Don (1837) 431; Walpers (1844) 80; Dunal in DC. (1852) 275; Fernald (1900) 561; Standley (1924) 1300; Standley & Morton (1938) 1083; White (1939) 666-668; Lawrence (1960) 32; McBride (1962) 252; Heine (1963) 335; Mitra (1967) 75-80; D'Arcy (1973) 703; Gentry & Standley (1974) 121.

Common name: giant devil's fig.

A *shrub* or small *tree* to 4 m tall (trunk to 20 cm diam.); prickles 2-6 mm long, usually sparse on stem, petioles, and veins on upper and lower leaf surfaces, flattened toward base, straight or slightly curved; all parts pubescent with stellate hairs (sessile or long, multiseriate-stalked, porrect-stellate with medium or long central cell); general aspect green but with rusty tomentum particularly on stem. *Leaf* to 40 x 30 cm, usually less, c. 25 x 21 cm, broadly ovate, with 7-13 lobes, sinuses cut one quarter of way to midrib; lobe apices obtuse, acute or acuminate, sinuses rounded; leaf base equal or oblique, truncate or rounded; petiole to 18 cm long, terete when fresh, with 3-10 prickles (sometimes absent). *Inflorescence* an extra-axillary, branched, dense scorpioid cyme; flowers numerous (to 50+), white, peduncle 1-2 cm long, variable, pedicels 1-1.5 cm long. *Calyx* tube 3-4 mm long; lobes 4-6 mm long, acuminate. *Corolla* 3-4.5 cm diam., stellate, lobes 15 x 10 mm long, glabrous within, pubescent outside, apices acute. *Filaments* (Fig. 161) c. 3 mm long; anthers c. 8 mm long, yellow, erect, not coherent, tapered. *Ovary* and style base sparsely glandular pubescent; style c. 1.3 cm long; stigma bluntly two lobed, pale green. *Fruit* (Fig. 150) 1-1.5 cm diam., globose, at first green, later yellowish to drab orange-yellow, brown when dry, not particularly fleshy, pedicels enlarged with marked corky thickening towards fruit attachment, c. 1.5 cm long, 5 mm thick; calyx lobes later broader and thicker, at first appressed, later somewhat reflexed. *Seeds* 2 mm diam., flat, light brown, shiny, without obvious surface pattern, 100-250 per fruit. *Cotyledons* 10 x 4 mm, oblong; petioles 5 mm long, first true leaves oval-ovate, scarcely lobed, not prickly until fourth leaf. (Fig. 35.)

Chromosome number: $n = 12$ Randell & Symon (1976).

Notes

Springily naturalised about the Brisbane area, it does not seem to have spread greatly nor to have become established in other States.

Distribution (Map 14)

Originally native to tropical Central America.

Selected specimens (total seen about 6)

QUEENSLAND: *White s.n.*, v. 1917, Woolloowin & Windsor (BRI, K); *Howard s.n.*, 13.ii.1964, 6 miles S of Brisbane (cult. plants to AD, ADW, BIRM, CANB, DAV, K, NSW).



Fig. 35. *Solanum hispidum* Pers. Drawn from field grown plant at the Waite Institute, from seed collected by G. Howard, 10 km east of Brisbane, Qld (ADW 31466). $\times 2/3$.

*37. *Solanum torvum* Sw., Nov. gen. sp. pl. prodr. (1788) 47.

Type citation: "Provenit in sepibus Jamaicae, Hispaniolae, Insulis Bermudensibus". Swartz, *Florae Indiae Occid.* 1 (1797) 456.

Type material: Not seen, possibly at S. For note on typification see Heine (1976:168).

Solanum largiflorum C.T. White, *Queensland Agric. J.* 8 (1917) 170; *Bot. Bull.* 20 (1918a) 16.

Type collection: C.T. White & W.D. Francis, Kin Kin, March 1916 (MEL, NSW).



Fig. 36. *Solanum torvum* Sw. Drawn from field grown plant at the Waite Institute, from seed from Symon 4755, collected near Hockley, south of Port Douglas, Qld (ADW 40797). $\times \frac{2}{3}$.

Literature

Dunal (1813) 203; Dunal (1816) 36; Don (1837) 430; Nees (1837) 53; Walpers (1844) 78; Dunal in DC. (1852) 260; Sendtner in Martius (1856) 94; Clarke (1883) 234; Mueller (1888) 398; Fernald (1900) 557; Hassler (1918) 230; Bitter (1919) 87; White (1919) 75; Bitter (1921) 252; Standley (1924) 1301; White (1933) 439; Burkill (1935) 2046; White (1937) 230; Parham (1938) 2-5; Standley & Morton (1938) 1095; Francis (1939) 444; Hurst (1942) 376; White (1946a) 280; Adelbert (1948) 327-333; Winders (1948) 198; Webb (1948) 160; Webb (1949) 50; Goodchild (1950) 77; Everist (1957) 71; McBride (1962) 263, 265; Heine (1963) 333; Backer & Bakhuizen (1965) 475; Chartol (1965) 119-128; Fayez & Salek (1967) 430-433; Krishnappa (1968) 163-173; Purseglove (1968) 556-563; D'Arcy (1973) 708; Hossain (1973) 291-301; D'Arcy (1974) 860; Gentry & Standley (1974) 139; Everist (1974) 479; Heine (1976) 166.

Common name: devil's fig.

A spreading or scrambling *shrub* to 2-3 m tall; *prickles* 3-7 mm long, slightly hooked, broad-based, scattered on stems, upper and lower leaf surface, main veins, sparse on aged and mature growth; all parts pubescent with stellate hairs, (sessile to long multiseriate-stalked, porrect-stellate, with short or long central ray), sparse on upper surface, dense below, general aspect dark green, discolorous. *Leaves* variable in size, 10-15 x 8-10 cm, often smaller, broadly oval-ovate, with 7 broad lobes; lobes somewhat triangular, acute or obtuse, 3-4 cm long; sinuses rounded, cut about one quarter of way to midrib; leaf base equal or unequal, somewhat sagittate to auriculate; petiole 2-5 cm long. *Inflorescence* a compact, branched, many-flowered (50-100) corymb, at first terminal, later becoming lateral, upper and late season flowers may be male; common peduncle short, 1-2 cm long; pedicels 5-10 mm long, pubescent with glandular and stellate hairs. *Calyx* 3-4 mm long; lobes apiculate, 2-3 mm long. *Corolla* to 2.5 cm across, stellate, white, the lanceolate lobes acute or obtuse, 1 cm long. *Filaments* (Fig. 161) 1 mm long; anthers 6-7 mm long, attenuate. *Ovary* globose, pubescent; style 8-10 mm long. Fruiting pedicels 1-1.5 cm long, thickened below calyx which is not much enlarged; *fruit* (Fig. 150) 1-1.5 cm diam., globular, drab yellow, few flowers set seed, produced in clusters of few to 10. *Seeds* 1.5-2 mm long, flat, drab brownish, slightly reticulate, (300-) 360 (-400) per fruit. (Fig. 36.)

Chromosome number: $n = 24$ Symon & Randell (1976). This does not agree with that of $n = 12$ reported by Fedorov (1969).

Notes

The legitimacy of this name and its typification are extremely complex problems not attempted here. For some comments see Heine (1976:166) and Hepper (1978:289). The name is used here in the widely accepted sense for the pantropic weedy *Solanum* illustrated in Heine (1976:169, Pl. 37) although the leaf illustrated there as *S. torvum* var. *daturifolium* (Pl. 38) is probably no more than the juvenile leaf of a vigorous plant. Such leaves have been produced from seed from plants with leaves as in Heine's Pl. 37 and both leaf types can be seen in Symon 4744 (ADW, B, CANB, K); Symon 4745 (ADW); Symon 4755 (ADW, B, CANB) and in plants cultivated from the last (ADW, B, BRI, CANB, K, NSW). It is obvious from these that differences in vigour alone produce a great range of leaf size and lobing.

Distribution and habitat (Map 10)

Originally from the West Indies, this species is now a pantropical weed. It is well established along the tropical coastline of eastern Qld in agriculturally disturbed sites.

Selected specimens (total seen about 50)

QUEENSLAND: *Scortechini s.n.*, Logan River (MEL); Everist 5129, 20.v.1952, Daintree (BRI, CANB, K); Symon 4743, 15.v.1967, Black River, N of Townsville (ADW, B, BRI, K, NSW).

*38. *Solanum giganteum* Jacq., Coll. 4 (1791) 125

Type citation: "In regione interiore ad Promontorium bonae Spei crescit."

Holotype: Not seen.

Literature

Dunal (1813) 202; Dunal (1816) 36; Don (1837) 430; Nees (1837) 47; Walpers (1844) 78; Dunal in DC. (1852) 258; Clarke (1883) 233; Bitter (1921) 256; Santapu (1948) 653; Lawrence (1960) 30; McBride (1962) 249; Watt & Breyer-Brandwijk (1962) 993; Heine (1963) 332; Chennaveeriah & Krishnappa (1965) 161-170; Krishnappa (1968) 163-173.



Fig. 37. *Solanum giganteum* Jacq. Drawn from herbarium specimen, ADW 32828, collected by C.R. Alcock from a garden at Pt Lincoln, SA. $\times 2/3$.

Common name: African holly.

A large *shrub* or small *tree* to 4 m, stems relatively thick; prickles stout, conical, 2-5 mm long, most confined to main stem and branches, few on petioles and leaves; stems and lower leaf surface white with close, dense tomentum of stellate hairs (minute sessile, porrect-stellate with short or medium central cell), sparse or absent above. *Leaves* to 17 x 8.5 cm, elliptical, green and glabrous or sparsely pubescent above when mature, white tomentose below, base rounded or cuneate, almost equal, apex acute; petiole 3-4 cm long, terete, densely pubescent. *Inflorescence* a dense, corymb-like, branched cyme of about 100 nodding lilac flowers; pedicels 1 cm long. *Calyx* tube 1-2 mm long; lobes 1.5-2.5 mm long, triangular. *Corolla* 1.5-2 cm diam., stellate; lobes 10 x 3-4 mm, glabrous within, pubescent outside. *Filaments* (Fig. 161) 1 mm long; anthers 2-3 mm long. *Ovary* and style glabrous or with a few, small, glandular hairs; ovary globular; style 5-7 mm long; stigma small, terminal. *Fruits* (Fig. 150) often numerous, globular, 6-8 mm diam., at first green, later shining red and finally blackish-red, pedicels erect. *Seeds* 2-3 mm diam., straw-coloured, shallowly reticulate under lens. (Fig. 37.)

Chromosome number: $n = 12$ Randell & Symon (1976).

Notes

Seithe (1962) and D'Arcy (1972) both place this species in section *Torva*. However, this is not a very satisfactory classification, because *S. giganteum* differs from typical plants of section *Torva* in its smaller, pendent flowers, its small, erect, red berries, its entire, markedly discoloured leaves, and dense minute tomentum. Section *Torva* is predominantly Central America in origin but *S. giganteum* is of African origin.

Distribution

Originally native to eastern Africa from the Cape to Ethiopia. It is occasionally grown in gardens but is not known to be naturalised.

Selected specimens (total seen about 8)

QUEENSLAND: *Dignan s.n.*, May 1950, Hentra (BRI).

SOUTH AUSTRALIA: *Belling s.n.*, 12.xi.1939, Whitwarta (ADW); *Alcock 771*, 13.x.1965, Pt Lincoln (AD, ADW).

WESTERN AUSTRALIA: *Morrison s.n.*, 1898, Guildford (PERTH); *Anon*, 1948, Perth (PERTH).

Section 17. *Irenosolanum* Seithe, Bot. Jahrb. Syst. 81 (1962) 301.

Type species: *S. woahense* Dunal.

The species of this small section are shrubs or small trees. They are mostly unarmed when mature (but see below) and are glabrescent or pubescent with sparse and minute stellate hairs. The leaves are entire and relatively large. The inflorescence is a simple cyme or sparsely branched panicle. The flowers are relatively small and mostly stellate, the anthers lanceolate and opening by terminal pores. The berry is succulent and red.

The species of this section occur on some Pacific islands, Papua New Guinea and northern Australia. Although Seithe describes the plants as unarmed and most herbarium specimens appear so, the young stems of *S. viride* are prickly and plants of *S. dunalianum* appear variable in that character; *S. tetrandrum* appears to be unarmed.

39. *Solanum dunalianum* Gaud. in Freycinet, Voyage . . . l'Uranie et la Physicienne: Botanique (1826) 448, t. 58.

Type citation: "In insulis Moluccis (Pisang)". (Dec. 1818).

Holotype: Probably P, not seen.

Literature

Miquel (1857) 645; Schumann (1898) 148; Schumann & Lauterback (1901) 532; Witasek (1913) 601; Bitter (1919) 70.



Fig. 38. *Solanum dunalianum* Gaud. Drawn from herbarium specimen, *Swan 141*, Embley River, 16 km south of Weipa, Cape York Peninsula, Qld (ADW 44726). $\times \frac{2}{3}$.

A *shrub* or small *tree* to several metres; prickles absent on the only Australian collection seen, reported 1-2 mm long, (including the type), straight, yellowish, sparse or strongly armed, young parts, especially inflorescence, pubescent with ephemeral, minute, yellowish, stellate hairs (sessile, porrect-stellate with a short central ray), mature twigs and leaves glabrous except for few hairs in leaf axils; general aspect deep green. *Leaves* concolorous; upper leaves usually geminate, unequal; larger leaves to 23 x 9 cm, (reported to 30 x 15 cm), commonly about 13 x 5 cm, elliptic, base broadly cuneate, tapering obliquely to petiole, apex acute to sub-acuminate, mid-vein channelled above, conspicuous below, primary lateral veins well developed, petiole 2-3.5 cm long, the second of each pair of leaves similar in shape but smaller, to 15 x 5 cm, commonly about 9 x 4 cm, petiole 5-10 mm long. *Inflorescence* a congested cyme of 10-20 flowers, often once forked, from an extra-axillary position frequently below a pair of leaves; peduncle to forking about 1 cm long; floral rhachis 5-10 mm long; pedicel 5-8 mm long. *Calyx* 2-3 mm long, shortly campanulate; lobes unequal 0.5-5 mm long, narrowly triangular, dentate. *Corolla* 2-3 mm diam., deeply stellate; lobes lanceolate, 4-5-partite in Australian material but reported mostly 4-partite, violet. *Filaments* (Fig. 161) 1-1.5 mm long; anthers 4-5 mm long, lanceolate-oblong. *Ovary* 1 mm long, globular, glabrous or with few stellate hairs at summit; style 8 mm long; erect, few stellate hairs towards base; stigma capitate, only slightly bilobed. Infructescence a congested cyme of 3-15 berries; peduncle not much enlarged; pedicel 1-1.5 cm long, erect, enlarged towards summit, slightly grooved, fruiting calyx 5-6 mm in diam.; *fruit* (Fig. 151) 8-10 mm diam., globose, ?orange or orange-red. *Seeds* 3 mm long, subreniform, slightly notched, flattened, pale, 40 in one fruit counted. (Fig. 38.)

Chromosome number: not known.

Notes

This species has only recently been collected in mainland Australia. It was originally described from the island of Pisang in the Moluccas. At least three varieties have been described, var. *lanceolatum* Witas. (1908), var. *inerme* Witas. (1913) and var. *puberius* Bitt. (1919). In the absence of more collections and better understanding of variation throughout the range of the species I am reluctant to apply a varietal name to the Australian collection although var. *inerme* Witas. may well apply.

Solanum dunalianum is most closely related to *S. tetrandrum* R. Br. amongst the Australian species. Both have relatively large simple leaves, few if any prickles, sparse stellate tomentum, 4-5-partite stellate flowers, congested cymose inflorescences and erect fruiting pedicels with reddish, globular berries. *S. dunalianum* differs from *S. tetrandrum* in its larger, elliptic, usually geminate leaves, glabrescence, sparse prickles, larger fruits and apparently much greater stature.

Distribution and habitat (Map 8)

Malesia, Papua New Guinea and some islands of the western Pacific; in Australia known only from collections from the Embley River in the far north Cape York Peninsula and from Thursday Island.

Specimens examined (all cited)

QUEENSLAND: *Palmer* 8, 1883, Thursday Island; tree 20-30 ft high, thick foliage, leaves 3-4" long and broad, clusters of green berries, grows in scrubs and rocky places one of the principal scrub trees, wood hard (MEL); *Swan* 141, Aug. 1974, Embley River, 16 km S of Weipa, Cape York Peninsula; "edge of rain forest, cleared area around 4 acres, burnt and prepared for market garden" (ADW, BRI, CANB).

40. *Solanum tetrandrum* R. Br., Prodr. (1810) 445.

Type citation: "(T) v.v." T denotes Littus intra Tropicum, i.e. the coast of Queensland and the Northern Territory to Arnhem Bay.

Type material: At K are two sheets: (a) with the Bennett number 2662 and "S. tetrandrum Br Arnhem N Bay" and "Solanum tetrandrum Arnhem N. Bay" and (b) the second sheet has only "Solanum tetrandrum North Coast". At MEL are two sheets (a) MEL 12399 with the label "Solanum tetrandrum Arnhem N Bay", and the second (b) MEL 12400 "Solanum tetrandrum North coast". At BM are three sheets (a) the first with simply "Solanum tetrandrum, North Coast Arnhem North Bay", (b) the second has the Bennett number 2662 and "2 Solanum tetrandrum New Years Island Mch 12 1803" and "2 Solanum tetrandrum var. North Coast" (c) the third has the Bennett number 2662 and



Fig. 39. *Solanum tetrandrum* R. Br. Drawn from pot grown plant at the Waite Institute, from Symon 7774, collected at Wallaby Beach, Gove, NT (ADW 42324, fruit from ADW 41013), $\times \frac{2}{3}$.

"2 *Solanum tetrandrum* Arnheim North Bay Feb 14 Desc 15 Island y¹ y²". I propose the last as lectotype. Today, island y¹ is called Cottons Island and y² Pobassoo Island.

Solanum inamoenum Benth., London J. Bot. 2 (1843) 228.

Type citation: "Feejee Islands, Mr. Hinds".

Type material: K and photo ADW.

Solanum tetrandrum R. Br. var. *floribundum* Benth., Fl. Aust. 4 (1868) 449.

Type citation: From Leichhardt's collection a single specimen in Herb. F. Mueller.

Holotype: not traced.

Literature

Brown (1810) 445; Dunal (1813) 170; Poiret (1814) 760; Dunal (1816) 18; Don (1837) 419; Walpers (1844) 61; Dunal in DC. (1852) 194; Seemann (1863) 206; Seeman (1866) 174, 176; Bentham (1868) 449; Mueller (1882) 96; Bailey (1883) 343; Bailey (1901) 1081; Schumann & Lauterback (1901) 532; Bailey (1913) 354; Ewart & Davies (1917) 243; Domin (1929) 1130; Heine (1976) 154.

A *shrub* to about 1 (-3) m high, almost completely deciduous during dry season, without prickles, all parts pubescent with stellate hairs (sessile, porrect-stellate, with long central ray), scattered on upper leaf surface, denser below, general aspect green. *Leaves* slightly discoloured, 8 (-18) by 5 (-15) cm, broad-elliptic, entire, juvenile leaves with shallowly repand margin, veins distinctly white above, apex rounded or acute, base cuneate or rounded, oblique, petiole 1-3 (-6) cm long. *Inflorescence* a short congested cyme of 5-20 flowers; peduncle to 5 mm long; floral rhachis 5-10 mm long; pedicel 5 mm long, slender, slightly thickened upwards. *Calyx* c. 2 mm long; lobes 2-3 mm long, lanceolate, variable in length. *Corolla* 2.5 cm diam., deeply stellate, flat or reflexed, lobes 3-4 mm wide, lanceolate, white or pale blue, generally 4-partite. *Filaments* (Fig. 161) 1 mm long; anthers 4-5 mm long, oblong, scarcely tapered, erect in cone. *Ovary* glabrous; style 9 mm long, slender, erect, bent at tip; stigma terminal, exceeding the anthers by 2-3 mm. Fruiting peduncle and calyx not much enlarged; *fruit* (Fig. 151) 5-7 mm diam., globular, bright orange-red, at first succulent, finally brownish-orange when dry, held erect or nearly so. *Seeds* 2-2.5 mm diam., pale or light grey, minutely reticulate, sixteen fruits from Symon 7774 had (5-) 12 (-18) seeds per fruit. (Fig. 39.)

Chromosome number: n = 12 Randell & Symon (1976).

Notes

This is one of the few species in Australia the range of which extends into the western Pacific at least as far as New Caledonia (Heine, 1976). In Australia it is narrowly confined to the northern coastline and offshore islands, and the relatively few specimens seen are morphologically very uniform. The leaves are like those illustrated by Heine (1976: pl.34), and the fruits (pl. 34, '8'); none of the Australian material approaches his pl. 34 '1'. It is very likely that subspeciation has proceeded amongst the isolated populations of the Pacific Islands.

S. tetrandrum is most closely related to *S. dunalianum* from which it differs in leaf shape, denser tomentum and smaller stature. It does not have other close relatives amongst the mainland Australian species. In Australia it may be almost leafless in the dry season which may in part account for the small number of collections available. Although collected from Pt Darwin repeatedly last century there have been no recent collections from that area.

Distribution and habitat (Map 7)

In N.T. and offshore islands, narrowly confined to the coastline. It has been collected from the margin of rainforest scrub on coastal sands.

Selected collections (total seen about 20)

NORTHERN TERRITORY: *Holtze* 46, Pt Darwin (MEL, NSW); *Stocker s.n.*, 31.i.1967, Maningrida

(ADW); *McKean* 409, 7.iii.1972, Humpty Doo (ADW, CANB, DNA, NT); *Symon* 7774, 19.vi.1972 Nhulunbuy, (ADW, BRI, CANB, K, L, NT).

41. *Solanum viride* R. Br., Prodr. (1810) 445.

Type citation: "(T) v.v." T denotes Littus intra Tropicum, i.e. the coast of Queensland and the Northern Territory to Arnhem Bay.



Fig. 40. *Solanum viride* R. Br. Drawn from herbarium specimen, *Moriarty* 823, collected in the Tinaroo Range, northern Qld (ADW 41,111). Fruit from *Webb & Tracey* 8351, Bingal Bay, Qld (ADW 37605). $\times 2/3$.

Type material: At BM is a sheet with the Bennett number 2664 and the label "Prope littus inter harbors ad Port I and Broadsound. 3 *Solanum viride* prodr 445". Port I is between Curtis and Facing Islands, Queensland. I propose this specimen as lectotype.

S. viride Parkinson, Jour. Voy. Endeavour, (1773) 38, nom. nud.

S. viride Forst. f., Pl. Esc. (1786) 72, nom. nud.

S. viride Forst. f., Fl. ins. austr. (1786) 89, nom. nud.

S. viridifolium Dunal in DC., Prodr. 13 (1852) 73, No. 138.

Type citation: "In Novae Hollandiae Nova Cambria australi, circa promontorium Grafton (Banks)".

Holotype: BM.

Solanum cymosum Banks ex Dunal. A manuscript name in Herb. Banks never published but used by Domin, Bibl. Bot. 89 (1929) 1130, in synonymy of *S. viride* R. Br.

Literature

Brown (1810) 445; Dunal (1813) 170; Poiret (1814) 760; Dunal (1816) 18; Don (1837) 416; Walpers (1844) 55; Dunal in DC. (1852) 190; Bentham (1868) 445; Mueller (1868) 145; Mueller (1882) 96; Bailey (1883) 343; McAlpine (1895) 855; McAlpine (1897) 38, 39; Bailey (1901) 1081; Bailey (1911) 67; Bailey (1913) 354; White (1918) 151; Domin (1929) 1130; White (1933) 96.

An erect *shrub* or small *tree* to 5 m tall, not known to be clonal, branched above, prickles present on stem of young plants, absent from mature twigs (and therefore absent from almost all herbarium specimens); very sparsely pubescent on young tips and corolla lobes with minute, pale, stellate hairs, (sessile, porrect-stellate with short or medium central cell); general aspect green and glabrous. *Leaves* concolorous, (7-) 10 (-15) x (3-) 4 (-6) cm, elliptic, entire, apex acuminate; base truncate, unequal; petiole 1-2 cm long, slender. *Inflorescence* a simple or more often twice dichotomously branched cyme of 10-50 flowers; peduncle 1-2 cm long to first fork; floral rhachis 2-4 cm long; pedicels 1-1.5 cm long, slender, slightly thickened upwards. *Calyx* tube 1-2 mm long, open, lobes 1-2 mm long, triangular, acumen 1 mm long. *Corolla* c. 1.5 cm diam., 4-5-partite, deeply stellate, lobes narrow, open or reflexed, pubescent outside, firm, interacuminal membrane scarcely developed, dark or pale purple. *Filaments* (Fig. 161) 1 mm long; anthers 4-5 mm long, in cone or loosely erect, distinctly tapered upwards. *Ovary* with few glandular hairs; style 5 mm long, erect, curved at tip; stigma green. Fruiting pedicels to 2 cm long; calyx scarcely covering base of fruit; *fruit* (Fig. 150) c. 1 cm diam., globular, finally orange to red. *Seeds* 2.5-3 mm long, light grey-brown, distinctly minutely reticulate. (Fig. 40.)

Chromosome number: n = 12 Randell & Symon (1976).

Notes

S. viride does not have close relatives amongst the Australian species of *Solanum*, its affinities being with Pacific species. It is one of the few species in Australia that reach small tree size.

Distribution and habitat (Map 2)

In northern Qld *S. viride* is confined to rainforest margins and disturbed sites like so many species of *Solanum*. It grows in soils ranging from sandy coastal dunes to ones derived from basalts or granites.

Selected specimens (total seen about 50)

QUEENSLAND: Banks & Solander *s.n.*, 1770, Cape Grafton (BM, P); Kajewski 1171, 4.vii.1929, Lake Eacham, Atherton tableland (BRI, K, P); Webb & Tracey 8351, 16.xi.1969, Bingil Bay (ADW, B, BIRM, BRI, CANB, K).

Section 18. **Graciliflorum** (Dunal) Seithe, Bot. Jahrb. Syst. 81 (1962) 302.

Graciliflora Dunal in DC., Prodr. 13 (1852) 29, 183, basionym (grad. ambig.).

Type species: S. graciliflorum Dunal.

The type species of this section came from Java and may be typified by Dunal's unpublished plate No. 47 now at MPU (photo ADW). The species name is not included in the Flora of Java, Backer & Bakhuizen (1965). In attempting to identify *S. graciliflorum* with contemporary species in Java it seems possible that it may be *S. jamaicense* Mill. or *S. junghuhnii* Miq. species originally from Central America but now weedy in a number of tropical sites. Seithe attributes species to this section from Asia, Australia, Central and South America.

The Australian species included here (Nos 42-52) all have acicular prickles (not hooked), stellate hairs, leaves which are relatively narrow and may be shallowly lobed (at least in young stages), simple cymose inflorescences (rarely branched), with (mostly) few rather than numerous flowers, stellate corollas, lanceolate anthers opening by terminal pores and red succulent fruits. However, the pedicels are not noticeably unilateral nor markedly deflexed.

Seithe includes *S. stelligerum* Sm. in her list of species studied and also *S. tetrandrum* R.Br. which I have included in section Irenosolanum.

42. **Solanum semiarmatum** F. Muell., Fragm. 2 (1861) 163.

Type citation: "Ad flumen Clarence River, Dr. Beckler".

Type material: The sheet MEL 12130 consists of two flowering shoots and a leaf. It has two labels "Solanum semiarmatum F.M. Ad flumen Clarence Beckler" and "Solanum semiarmatum ferd. Mueller Ad flumen Clarence Beckler". I consider this to be a holotype. There are isotypes at K & NSW.

Solanum mitchellianum Domin, Repert. Spec. Nov. Regni Veg. Beih. 12 (1913) 131.

Type citation: "Sub tropical New Holland, leg. Mitchell. 1846".

Lectotype: Domin did not cite a holotype but it is known that he saw collections at K. I propose the upper half sheet bearing the Mitchell label at K as lectotype, and with isoelectotypes at BM and L. The specimen at L is labelled '602'.

Literature

Mueller (1861) 163; Bentham (1868) 457; Mueller (1868) 146; Scortechini (1881-82) 165; Mueller (1882) 96; Bailey (1883) 345; Moore (1893) 334; Bailey (1901) 1087; Dixon (1906) 223; Bailey (1912) 199; Bailey (1913) 357; Maiden & Betche (1916) 181; Domin (1929) 1139.

An erect clonal *shrub* to 2 m tall, though commonly less; prickles to 1.5 cm long, unequal, fine, straight, reddish, abundant on stems (may be almost obscured by them at times), frequent on petioles, peduncles, upper and lower leaf surfaces, sparser on distal branches of inflorescence and calyx; all parts pubescent with stellate and glandular hairs (sessile to long-multiseriate-stalked, porrect-stellate, with long central ray, and minute simple, glandular), sparse on upper leaf surface, largely confined to veins, dense below, often with long, tangled, stellate hairs, general aspect dark green, leaves discolorous when lower pubescence well developed. *Leaves* variable; lower leaves to 15 x 14 cm, usually much less, 5-8 x 3-6 cm, ovate, with 5-9 triangular lobes, cut half to one third of way to midvein, sinuses angular or rounded, lobes angular or oblong, leaf and lobe apices blunt or acute; leaf base rounded to sub-cordate, often oblique; upper leaves as small as 4 x 1.5 cm, elliptic-lanceolate, entire or with few shallow lobes; petiole 0.5-1 cm long. *Inflorescence* a simple or 2-3 times dichotomously branched cyme, small, flowers few (5-6) to numerous (>20); peduncle (to first fork) 1.5-6 cm long; floral rhachis to 5 cm long; each final branch with 10-12 flowers; pedicels 3-10 mm long. *Calyx* tube 2-4 mm long; lobes 2-3 mm long, triangular, acumen scarcely developed. *Corolla* 1-1.5 cm diam.,

deeply stellate, often reflexed, bluish-purple. *Filaments* (Fig. 162) 1 mm long; anthers 3 mm long, oblong and tapered upwards. *Ovary* glabrous; style 5-6 mm long, erect, glabrous; stigma green. Fruiting pedicels about 1 cm long, slightly thickened upwards; calyx not much enlarged, covering base of fruit; *fruit* (Fig. 151) 8-12 mm diam., globular, dark red to finally black, succulent, slightly translucent when lightly coloured, shed when ripe; pulp and juice red. *Seeds* 2-2.5 mm long, distinctly minutely reticulate to almost shaggy, some with narrow wing 0.25 mm wide, pale or light brown; 6 fruits collected in wild averaged 26 seeds, fruits from plants in cultivation had (36-) 60 (-74) seeds.



Fig. 41. *Solanum semiarmatum* F. Muell. Drawn from pot grown plant from Henderson 1260, collected in the Toonumbar State Forest, NSW (ADW 42709, fruit from ADW 40402). $\times 2/3$.

Cotyledons about 8 x 4 mm, ovate-lanceolate, minutely glandular hairy, hypocotyl densely glandular hairy, first true leaf broad ovate, prickles on petiole and mid-vein. (Figs 41 and 42.)

Chromosome number: $n = 12$ Randell & Symon (1976) and, in addition, plants grown from *Henderson 1260* and *Tracey*, Narayan have also been counted as $n = 12$ by Randell and B.C. Joshi respectively.



Fig. 42. *Solanum semiarmatum* F. Muell. Drawn from pot grown plant at the Waite Institute, from L.G. Tracey, collected at Narayan, Qld (ADW 42322). $\times \frac{2}{3}$.

Notes

The range of morphological variation accepted here is considerable and plants vary greatly in the number of prickles, amount of pubescence, complexity of the inflorescence, and fruit colour, which may range from red to nearly black. However, I have not found any convincing way of separating specimens from the high rainfall forests of the McPherson Ranges from those of drier sites in south eastern Qld, which were called *S. mitchellianum* by Domin. The Mitchell collection consists of flowering and fruiting terminal shoots of a mature bush, the lower leaves and juvenile phases not being present. The species may be considered to be "primitive" or ancestral to the red fruited species of the east coast on the basis of its relatively large lobed leaves, large branched inflorescence (sometimes simple), and somewhat erect woody habit. *S. semiarmatum* is related to *S. stelligerum*, *S. corifolium* and, to a lesser extent, *S. densevestitum*, but differs from all three in the great degree of lobing of the leaves, strikingly prickly stems and often branched inflorescence.

Distribution and habitat (Map 5)

Qld, in the south east, and N.S.W., in the far north east. It has been collected from rainforest margins on the Lamington Plateau, along creek banks in vine forests and wet sclerophyll vegetation, often on soils derived from basalts.

Selected specimens (total seen about 65)

QUEENSLAND: *Bailey s.n.*, Oct. 1891, Killarney (BRI, NSW); *Gordon 8001*, 1970, Myall Park, Glen Morgan (ADW, B, CANB, K); *Moriarty 1559*, 18.ix.1974, Injune-Rolleston Road (ADW, BRI, CANB, K, MO).

NEW SOUTH WALES: *Roe 258*, 30.ix.1950, 12 km from Crooble on Warialda Road, (CANB, NE); *Henderson & Parham 1260*, 22.ii.1972, Toonumbar State Forest (ADW, BRI) and cultivated plants to (BRI, MO); *Clark, Pickard & Coveny 1652*, 23.vii.1969, Moore Park, Grevillea (ADW, NSW).

43. *Solanum stelligerum* Sm., *Exotic Botany* 2 (1805) 57 t. 88.

Type citation: "This shrub grows to the height of 3, 4 or 5 feet in its native country of New South Wales, forming a dense bush but is a stranger to our gardens". The plant was introduced to cultivation about 1792 by Dr John White who was surgeon general at Botany Bay and who contributed numerous specimens of New Holland plants.

Type: In the Smith herbarium (LINN).

Solanum magnifolium F. Muell., *Fragm.* 6 (1867) 27.

Type citation: "In vallibus sylvaticis prope sinum Rockingham's Bay, Dallachy".

Type material: Syntype, K.

S. stelligerum Sm. var. *magnifolium* Benth., *Fl. Aust.* 4 (1868) 451.

Type citation: "Murray River, Rockingham Bay, Dallachy; mountain brush, Moreton Bay, Leichhardt (both in Herb. F. Mueller)".

Syntypes: the first is at K, the second not traced.

Solanum stelligerum var. *lucorum* F. Muell. ex Benth., *Fl. Aust.* 4 (1868) 451.

Type citation: F. Mueller, Araucaria Ranges, Burnett River.

Type material: K two sheets, MEL, and photos ADW.

S. lucorum Domin, *Repert. Spec. Nov. Regni Veg.* 12 (1913) 130.

Type citation: Queensland: Araucaria Ranges, Burnett River, leg. Ferd. von Mueller (Oct. 1856).

Type material: K two sheets, MEL.

S. accedens Domin, *Repert. Spec. Nov. Regni Veg.* 12 (1913) 130.

Type citation: Queensland, Rockhampton, leg. Dallachy.

Type material: K.

This appears to be a slender plant with somewhat smaller and narrower leaves and I doubt its specific status.

Solanum stelligerum var. *procumbens* C.T. White, Proc. Roy. Soc. Qld 55 (1944) 72.

Type citation: Moreton District: Lamington National Park, alt. ca. 1.000 m., in rain-forest, C.T. White 11889 (type: flowers), 27.11.1942 (prostrate *Solanum*, creeping stems rooting freely and here and there sending up shoots 20-30 cm. high, flowers lilac); Numinbah, C.T. White 10232 (flowers), 10.4.1935 (procumbent *Solanum* common on floor of rainforest, rooting here and there at the nodes); Currumbin, C.T. White sine no. (flowers), Sept. 1912 (quite prostrate, almost carpet-like, occasionally half-climbing), head of Little Nerang River, C.T. White sine No. (flowers), Jan. 1916 (a *Solanum* creeping near the ground).

Type material: BRI 10423 and 10424 White 11889, 2 sheets and photos ADW; paratypes BRI. A prostrate form with short broad leaves.



Fig. 43. *Solanum stelligerum* Sm. Drawn from field grown plant at the Waite Institute, from seed from B. Whitehead, collected from Budgewoi, NSW (ADW 32931). $\times \frac{2}{3}$.

Literature

Brown (1810) 445; Dunal (1813) 201; Poiret (1814) 762; Dunal (1816) 27; Don (1837) 424; Walpers (1844) 68; Dunal (1852) 191; Bailey & Tenison-Woods (1879-80) 171-172; Bentham (1868) 450; Mueller (1868) 147; Mueller (1880-1881) 287; Mueller (1882) 96; Bailey (1883) 343; Hamilton (1887) 289; Moore (1893) 333; Baker (1896) 458; Bailey (1901) 1083; Dixon (1906) 222; Carne (1910) 856; Bailey (1912) 199; Petrie (1912) 229; Bailey (1913) 354; Hamilton (1916) 171; Maiden & Betche (1916) 181; White (1920) 29; Domin (1929) 1133; Chisholm (1934) 153; White (1937) 85; Hurst (1942) 375; Gascoigne *et al.* (1948) 44; Webb (1948) 160; Webb (1952) 94; Beadle, Evans & Carolin (1962) 401.

Common name: devil's needles.

An erect, sparingly clonal, woody *shrub* 1.5 (2) m tall; prickles to 12 mm long, fine, straight, often reddish, scattered on stems, less common or absent on upper and lower leaf surfaces, generally absent from peduncles, pedicels and calyces; all parts pubescent with stellate hairs, (sessile to long-multiseriate-stalked, porrect-stellate, with long central ray), sparse to absent on upper leaf surface, except along veins, dense pale or rusty below, general aspect dark green, leaves markedly discolorous. *Leaves* (3-) 5 (-12) x (0.8-) 1 (-3.5) cm, lanceolate-elliptic, entire or margin slightly irregular, apex acute to acuminate, base cuneate to rounded, slightly unequal, veins impressed above. *Inflorescence* a small, umbel-like cyme of to 10 flowers, from an extra-axillary position, a solitary flower on very short peduncle may also occur; peduncle to 2 cm long; pedicel 1-1.5 cm long, slender, thickened upwards. *Calyx* tube 2 mm long; lobes 2-3 mm long, triangular, acuminate 2-3 mm long, linear. *Corolla* 2.5 cm diam., deeply stellate, pale lilac to almost white, often reflexed. *Filaments* (Fig. 162) 1 mm long, anthers 5 mm long, narrow-oblong, distinctly tapered upwards, sometimes with dark tips, at first firmly erect in cone, later loosely erect. *Ovary* glandular-pubescent at summit; style to 8 mm long, glandular-pubescent below, erect, pale; stigma capitate, pale. Fruiting pedicels 2-3 cm long, thickened upwards, calyx lobes to 8 mm long; *fruit* (Fig. 151) 8-10 mm diam., globular, bright red, succulent. *Seeds* 1.5-2 mm long, minutely reticulate, pale or light yellow. In 7 fruits (49-) 69 (-96) seeds were counted, second group of 9 fruits had (44-) 60 (-68) seeds. *Cotyledons* 9 x 5 mm, ovate-lanceolate, first true leaf ovate-orbicular, 11 x 11 mm, sparsely stellate and with a prickle. (Fig. 43.)

Chromosome number: $n = 12$ Randell & Symon and, in addition, Symon 4702.

Notes

S. stelligerum varies considerably in size depending on factors such as vigor, age of growth, and shading which probably accounts for the array of synonyms. It is widespread along the east coast and like *S. prinophyllum* is more variable in south eastern Qld where it cohabits with *S. corifolium* and with which there may be hybridisation. It is most closely related to *S. corifolium* from which it differs in its generally more erect habit, denser tomentum, leaf shape and smaller fruits.

Brown (1810) 445 indicates two varieties "α, Aculei caulini leviter curvati (J) v.v." citing Smith (above) and "β, Aculei caulini recti. (T.) v.v." The letter 'T' represents a locality on the east coast, probably on the Queensland coast, and may be represented by a Banks and Solander specimen 'New Holland, 1770' at BM, or by Brown collection (2668), 1802, Pt. Clinton at BM, or (2670), 1802, Keppel Bay at E, K. However, Dunal (1852) 191-192, suggests that var. β is represented by a specimen from Pt. Jackson. The unpublished plate t. 57 to which Dunal refers (photo ADW), represents an average specimen in flower and with detached fruit. The Brown specimen (2670) is represented at P. I do not consider that straight and slightly curved prickles warrant varietal separation.

Distribution and habitat (Map 17b)

Qld and N.S.W., along the east coast from a little north of the Vic. border to the Atherton tableland. It has been collected from coastal sand dunes, open and dense *Eucalyptus* forest, to rainforest margins on soils derived from basalts, on sandy loams and on dune sands and, less commonly, from clays.

Selected specimens (total seen about 150)

QUEENSLAND: *Banks s.n.*, 1770, New Holland (BM); *Hubbard 5195*, 24.xi.1930, Mt Mistake (L, G, K); *Tracey s.n.*, 2.v.1969, Mt Glorious (ADW, B, CANB, K, US); *Everist 7176*, 3.vi.1962, Mt Maroon (BRI, CANB, L).

NEW SOUTH WALES: *Rodway 1684*, 27.i.1935, Lake Congala N of Wilton (K, NSW, P); *Constable s.n.*, 12.xii.1950, Ulladulla (K, L, NSW); *Rodd s.n.*, 24.x.1965, Mt Yengo (ADW, NSW).

44. *Solanum parvifolium* R. Br., Prodr. (1810) 446.



Fig. 44. *Solanum parvifolium* R. Br. Drawn from herbarium specimen from *Dunlop 504*, collected at Warrumbungles, NSW (ADW 38735). Fruit from M.R.O. Millet, Western Creek, Milmerran, NSW (ADW 35987). $\times \frac{2}{3}$.

Type citation: "(T.) v.v." T. denotes Littus intra Tropicum, i.e. the coast of Queensland and Northern Territory westward to Arnhem Bay.

Type material: At BM is a sheet bearing the Bennett number 2673 and the label "prodr 446, 11 Solanum parvifolium No. 69 descr. Sept. 18 Desc. 19 1802 Broadsound" as well as a 'Type Specimen' label. I propose this as lectotype; isolectotypes of this are at K and MPU.

Solanum angustum Domin, Biblioth. Bot. 89 (1929) 1142.

Type citation: Nord-Queensland, steinige und Grasige Hugel am Walsh river nordlich von Chillagoe Domin ii.1910.

Holotype: PR 530924, photo ADW (Domin 8310, Feb. 1910).

Literature

Brown (1810) 446; Dunal (1813) 182; Poiret (1814) 777; Dunal (1816) 27; Don (1837) 434; Walpers (1844) 67; Dunal in DC. (1852) 191; Bentham (1868) 451; Mueller (1882) 96; Bailey (1883) 344; Moore (1893) 333; Baker (1899) 442; Bailey (1901) 1083; Dixon (1906) 222; Maiden (1908) 70; Cambage (1908) 51; Cambage (1912) 646; Bailey (1913) 354; Maiden & Betcher (1916) 181.

An erect woody *shrub*; prickles 4-7 mm long, fine, straight, reddish-brown, scattered or abundant on stems, rare or absent elsewhere; most parts with close, dense tomentum of minute stellate hairs (sessile or shortly multiseriate-stalked, porrect-stellate with short or medium central ray), sparse or absent on upper leaf surface, dense and pale below; general aspect dull dark green, markedly discolorous. *Leaves* (1.5-) 3.5 (-5) x (0.5-) 0.7 (-1) cm, oblong, entire, mid-vein usually prominent, leaf apex rounded or acute, base rounded, often oblique, petiole 3-5 mm long. *Inflorescence* a subumbellate cyme of 2-5 flowers, solitary pedicellate flowers also occur; peduncle to 6 mm long; pedicel c. 7 mm long. *Calyx* tube c. 2 mm long; lobes c. 2 mm long, oblong or bluntly triangular with short acumen. *Corolla* 1 cm diam., deeply stellate, pale blue or white. *Anthers* (Fig. 162) 3-4 mm long, tapered, loosely erect. *Style* erect, slightly exceeding anthers. Fruiting peduncle not much enlarged; pedicels to 1.5 cm long, slightly enlarged upwards; calyx covering base of fruit; *fruit* (Fig. 151) 5-8 mm diam., globular, finally bright red when ripe. *Seeds* 2-2.5 mm long, pale or brown, distinctly reticulate, (17-) 30 (-37) in 9 fruits counted. (Fig. 44.)

Chromosome number: unknown.

Notes

S. parvifolium links *S. ferocissimum* with *S. stelligerum*, to both of which it is closely related, and from both of which it may be difficult to distinguish. *S. ferocissimum* is more intricate in habit, generally extremely prickly and with narrower, greener leaves and smaller fruits. *S. stelligerum* differs in its larger, broader leaves and larger fruits. It is less closely related to *S. chenopodium* from which it differs in leaf shape and in having fewer, larger fruits.

No other collections have been attributed to *S. angustum*. The type specimen consists of three leafy portions, one with a fruit attached and a second detached fruit present. From the photograph, the plant is obviously closely related to *S. parvifolium* R.Br. and to a lesser extent *S. ferocissimum* Lindl. The type locality of *S. angustum* is at the northern extremity of the distribution of *S. parvifolium*. The berry of *S. angustum* was described as 1.5 cm diam., which is larger than usual for *S. parvifolium*. However, the seeds of *S. angustum*, which have been examined, are very similar to those of the two related species. I therefore prefer to consider *S. angustum* Domin as an extreme form of *S. parvifolium* until further specimens are collected.

Distribution and habitat (Map 6)

Qld, in the south, and N.S.W., in the north, collected on red or dark clays and loams.

Selected specimens (total seen about 50)

QUEENSLAND: *Everist* 7153, 21.iii.1962, Benandri (ADW, BRI, CANB); *Moriarty* 1557, 18.ix.1974, Injunerolleston Road (ADW, BRI, CANB).

NEW SOUTH WALES: *Dunlop* 504, 21.viii.1969, Warrumbungle Nat. Park (ADW, CBG); *Streimann* 683, 9.xii.1973, Split Rock, NW of Coonabarabran (A, ADW, BRI, CBG, L).

45. *Solanum ferocissimum* Lindl. in Mitchell, Three Exped. 2 (1838) 58.

Type citation: From the text "I found on the low tract between Burradorgang and our camp a new curious species of *Solanum* so completely covered with yellow prickles that its flowers and leaves could scarcely be seen". . . . Apl 28, 1836, J. Richardson was the collector.

Holotype: CGE. The specimen bears the label:- "Interior of New Holland, *S. ferocissimum* M., Major Mitchell's Expedition 1836, 27 Apl. (97)". Isotype K, MEL.



Fig. 45. *Solanum ferocissimum* Lindl. Drawn from field grown plant at the Waite Institute, from seed of Pedley 788, from 8 km west of Westmar, Qld (ADW 32976). $\times 2/3$.

Solanum leptophyllum F. Muell., *Fragm.* 2 (1861) 164.

Type citation: (1) Ad flumina Mackenzie et Sutor, *F. Mueller*; (2) ad rivum Castlereagh, *Bowman*; (3) ad oppidulum, *Warwick*; (4) et in montibus Barrier Range, *Beckler*; (5) ad montem Murchison, *Dallachy*.

Syntypes: (5) K, the rest not traced.

Solanum ferocissimum Lindl. var. *hastilobum* Domin, *Biblioth. Bot.* 89 (1929) 1135.

Type citation: (1) New South Wales, Mt Murchison, *Dallachy*; (2) South Australia, Mt Illbillie, *R. Helms*, 4.vi.1891.

Syntypes: (1) K; (2) AD, K, NSW.

Solanum ferocissimum Lindl. var. *rectispineum* Domin, *Biblioth. Bot.* 89 (1929) 1134.

Type citation: (1) Queensland; Auf den Sandsteinhügeln der Dividing Range bei Jericho *K. Domin* Mch. 1910 No. 8276-8280; (2) New South Wales, Peels Range, *Frazer*; (3) Peels Range, *Cunningham*.

Syntypes: (1) PR (4 sheets all five numbers); (2) BM, OXF, K; (3) BM.

Solanum stenophyllum A. Cunn. ms., non Humb. & Bonpl. ex Dunal (1816).

Literature

Dunal in DC. (1852) 373; Bentham (1868) 451; Mueller (1868) 147 as *leptophyllum*; Mueller (1882) 96; Bailey (1883) 344; Tate (1883) 104; Tate (1890) 145; Mueller & Tate (1896) 373; Moore (1893) 333; Bailey (1901) 1083; Cabbage (1905) 218; Dixon (1906) 222; Haviland (1911) 529; Bailey (1913) 354; Maiden & Betche (1916) 181; Collins (1923) 247; Black (1926) 497; Domin (1929) 1134; Black (1957) 747.

An erect, intricate, clonal *shrub* 0.5-1 m tall; prickles 5-10 mm long, straight, light or dark brown, abundant on stems, upper and lower leaf surfaces and peduncles, usually absent from pedicels and calyces; leaves sparsely pubescent above with stellate and some minute glandular hairs (sessile, porrect-stellate with short or medium central cell and minute simple glandular hairs), pubescence denser below, not greatly so, general aspect green, not discoloured. *Leaves* (3-) 5 (-10) x 0.2-0.7 cm, linear or linear-hastate, margin entire, with or without one or two basal lobes variously developed, lobes to 5 mm long, leaf apex acute, base cuneate or truncate, unequal. *Inflorescence* a cluster or short cyme of 3-6 flowers; peduncle to 3 mm long, or absent; floral rachis to 0.5 (2) cm or absent; pedicels to 1 cm long, slender, almost glabrous, slightly thickened upwards. *Calyx* tube 1 mm long, open; lobes 1-1.5 mm long, triangular, sparsely stellate and glandular pubescent. *Corolla* 2 cm diam., often strongly reflexed, deeply stellate, white or pale purple-blue. *Filaments* (Fig. 162) 1 mm long; anthers 5 mm long, attenuate-oblong, loosely erect. *Ovary* with few glandular hairs towards apex; style glabrous, erect, projecting slightly beyond anthers; stigma capitate, green. *Fruit* (Fig. 151) 5-8 mm diam., globular, at first green, later shiny red, succulent, finally almost black. *Seeds* 2-4 mm long, variable in size, pale or light grey-brown, seed numbers variable (1) 14 fruits counted had (8-) 24 (-50) seeds; others (2) 2,5,7; (3) 9,10,13 seeds. *Cotyledons* 15 x 6 mm, lanceolate, minutely glandular ciliate, petiole 6 mm long, first true leaf 17 x 9 mm, broad lanceolate, sparsely hairy but with prickle on mid-vein. (Fig. 45.)

Chromosome number: $n = 12$ and $n = 24$ Randell & Symon (1976), in addition $n = 12$ has been counted in the collection *Tracey*, Narayen, Qld by Randell.

Notes

Variation in leaf width occurs and young plants frequently have subhastate leaves with basal lobes which are not always evident on mature specimens. Flowers may be white or pale blue. *S. ferocissimum* is closely related to *S. parvifolium* from which it differs in its more copious prickles, and leaves scarcely discoloured with sparser tomentum below. It is less closely related to *S. chenopodinum* from which it differs in leaf shape, prickles and infructescence. *S. ferocissimum*, *S. parvifolium* and *S. stelligerum* form a closely related trio of species and their separation is not always easy. The major disjunctions in distribution (see Map 1) suggest that *S. ferocissimum* may be a relic species the original distribution of which has been disrupted by aridity in inland Australia. Like plants of *S. chenopodinum*, collections of *S. ferocissimum* in central Australia frequently come from within the shelter of shrubs or the shade of trees.

Distribution and habitat (Map 1)

This species has an interesting disjunct distribution with isolated populations in W.A., central Australia, and the largest, in eastern Australia. In W.A. the few collections have come from creeklines, in central Australia it has usually been found in sandy soils with the protection of other plants and in N.S.W. it is reported on red loamy soils.

Selected specimens (total seen about 100)

WESTERN AUSTRALIA: *Beaglehole* 48686 and 48903, Aug. 1974, Hamersley Range (acb, ADW); *Symon* 5467, 5.vii.1967, 80 km NW of Menzies (ADW, PERTH).

NORTHERN TERRITORY: *Lazarides* 5981, 13.ix.1956, 24 km N of Mt Riddock Stn (AD, BRI, CANB, K, MEL, NSW); *Latz* 121, 29.i.1968, 22 km SW of Alice Springs (AD, ADW, BRI, MEL, NT).

QUEENSLAND: *White* 9725, 22.iv.1952, Bidden State Forest Gilgandra (CANB, K, NSW); *Briggs* 2681, 17.v.1969, 17 km SE of Tottenham on road to Tullamore (ADW, NSW).

SOUTH AUSTRALIA: *Helms s.n.* 4.vi.1891, Mt Illbillie (AD, K, NSW); *Shaw* 458, 10.x.1966, 16 km E of Teyon Homestead (AD, ADW).

46. *Solanum corifolium* F. Muell., *Fragm.* 2 (1861) 166.

Type citation: "In nemoribus Araucariarum circum sinum Moreton Bay".

Type material: At MEL is a specimen with the label "Dec. 1856 Araucaria Ranges the Burnett River, Bunya Bunya Ranges", which may be the type collection, here proposed as lectotype, isolectotypes at K and TCD.

Solanum shirleyanum Domin, *Biblioth. Bot.* 89 (1929) 1132.

Type citation: "Süd Queensland: Regenwälder der Tambourine Mts. (Domin 111 1910), mit den Eltern".

Type material: PR530881 and PR530882 and photos ADW. Domin considered this a hybrid between *S. discolor* x *stelligerum*. The collection consists of 4 slender leafy branches and appears to be *S. corifolium* growing under shady conditions.

Solanum discolor var. *procumbens* C.T. White, *Proc. Roy. Soc. Qld* 55 (1944) 71.

Type citation: "Darling Downs District: Upper Teviot, *Rev. B. Scortechini* (type: Herb. Melb.) Moreton District: Canungra, in rain-forest, C.T. White, May 1917. Wide Bay District: Kin Kin, C.T. White, Jan. 1917".

Type material: (a) MEL and photo ADW; (b) BRI 10419 and photo ADW; (c) BRI 10418 and photo ADW. A rather prostrate spreading biotype but typical in fruit, etc.

Literature

Mueller (1868) 147 as *S. discolor*; Bentham (1868) 450; Bailey & Tenison-Woods (1879-80) 171; Mueller (1882) 96; Bailey (1883) 343; Moore (1893) 333; Bailey (1901) 1082; Dixon (1906) 222; Bailey (1913) 354; Maiden & Betche (1916) 181; White (1920) 29; Domin (1929) 1132; White (1943) 71.

An erect or sprawling *shrub* to 1.5 m, lower branches sometimes rooting in forest debris; prickles to 1 cm long, slender, straight, dark reddish-brown, abundant on stem, common on upper leaf surface, fewer or absent below, present on petiole and peduncle. *Leaves* densely pubescent below with stellate hairs (sessile, porrect-stellate hairs with a short central ray), glabrous above or with sparse, minute, stellate hairs along veins, general aspect dark green, distinctly discolourous, 5-10 x 2.5-5 cm, elliptic, lower leaves with 5-7 broad shallow lobes, sinuses broad and rounded, upper leaves entire or with weakly sinuate margin, leaf apex acute or rounded, leaf base oblique, cuneate or rounded; petiole 5-10 mm long. *Inflorescence* a cyme of few to 12 flowers from an extra-axillary position; peduncle c. 5 mm long; floral rhachis to 1 cm long, congested; peduncle c. 5 mm long; pedicel c. 1 cm long, curved and slightly thickened upwards, unarmed. *Calyx* tube 2-3 mm long, short and open; lobes 2-3 mm long, oblong. *Corolla* 2 cm diam., deeply stellate, lobes triangular with little interacuminal tissue, white or violet. *Filaments* (Fig. 162) 1 mm long; anthers 5 mm long, tapering, loosely erect. *Style* about 8 mm long, erect, pale; stigma capitate, green, just at or beyond anther pores. Fruiting pedicel deflexed but not greatly enlarged; *fruit* (Fig. 151) 1-1.5 cm diam., globular, at first pale green streaked with dark green, finally bright red (close to RHS Currant Red 821). *Seeds* 2 mm diam.,

pale, minutely reticulate. *Cotyledons* ovate-lanceolate 7-10 x 3-5 mm, first true leaf to 15 x 12 mm, ovate-orbicular, dark shiny green, with few stellate hairs, second seedling leaves 13 x 12 mm, prickly. (Fig. 46.)

Chromosome number: $n = 12$ Randell & Symon (1976) in addition plants from Tracey, coll. Mt Glorious, Qld.



Fig. 46. *Solanum corifolium* F. Muell. Drawn from herbarium specimen, Moriarty 915, from D'Aguilar Range, north-west of Brisbane, Qld (ADW 41088). $\times 2/3$.

Notes

Solanum corifolium is a variable species. It is found in the wet sclerophyll and rain forest of the east coast. Variants occur in these habitats and the plants may be erect, sprawling or prostrate, almost unarmed or very prickly, the flowers white or blue. Some specimens tend to approach *S. stelligerum* on one hand, in having relatively small berries, and *S. discolor* on the other, having somewhat larger leaves with undulate or very shallowly lobed margins.

Distribution and habitat (Map 12)

Northern N.S.W. and eastern Qld in the high rainfall scrubs and rain forest. It has been recorded from vine forest margin and rain forest, mainly in soils derived from basalts.

Selected specimens (total seen about 40)

QUEENSLAND: *White* 12730, 6.v.1945, Tambourine Mtn (BRI, K); *Webb & Tracey* 10738, 23.ii.1972, Laceys Creek (ADW, CANB, L); *Moriarty* 1505, 1506, 1507, 28.xi.1973, Yarraman (ADW, BRI, CANB).

NEW SOUTH WALES: *Forsyth* 5106, Nov. 1898, near Byron Bay (BM, NSW); *Clark, Pickard & Coveny* 1260, 19.vii.1969, Victoria Park SSW of Alstonville (ADW, NSW).

47. *Solanum yirrkalensis* Symon, sp. nov.

Suffrutex effusus usque 50 cm erectus. Aculei usque 5 mm longi inaequales, recti, tenues primo in caulis dispersi postea absentes. Caules, petioli, alabastra, folia infra pilis stellatis densis minutis canis pubescentes, plus minusve supra absentes adspectu generali discolori. *Folia* inferiora usque 12 x 6 cm, late elliptica, parum lobata, folia superiora 5-10 x 2.5-4 cm, elliptica integra; petiolus 1-1.5 cm longus. *Inflorescentia* cymosa (usque 8 flores); pedunculus 0.5-2 cm tenuis; flores inferiores hermaphroditi, flores superiores masculi. *Flos hermaphroditus*; pedicellus 2 cm longus; tubus calycis 2-3 mm longus, lobi calycis 1-3 mm longi, lanceolati exigue pubescentes sine aculeis. *Corolla* usque 2.5 cm diam. profunde stellata alba vel caesia; filamenta 1 mm longa; antherae 5 mm longae, lanceolatae, erectae conum facientes; ovarium 1-1.5 mm diam. sparsim pilis glanduligeris; stylus 6 mm longus, pallidus, erectus. *Flos masculinus*: calyx 3-5 mm longus, lobi perbreves et lati; corolla 1-1.5 cm diam. profunde stellata; lobi acuti; filamenta 1.5 mm longa; antherae 5 mm longae lanceolatae laxae erectae; ovarium et stylus et stigma vestigiales. *Bacca* 1.5 cm diam. globosa, rubra. Semina 4-5 mm longa, subreniformia, copiose hirsuta.

Holotypus: NT. *Isotypi*: ADW (BRI, CANB, DNA, K, L, NSW not seen). *Hinz* 7633, 27.ii.1976. Edge of forest near Yirrkala Gardens, $\pm 12^\circ 15'$, $136^\circ 50'$. Plant up to 50 cm high growing under trees on the south side of sand dunes in brown sandy humic soil. Mature fruit orange-red, c. 1 cm diam. (Fig. 47.)

Small spreading *shrub* ("low herbaceous plant to 50 cm"); prickles to 5 mm long, unequal, straight, fine, scattered on stem and a few on leaf surface, later stems and leaves may lack prickles; densely pubescent on stems, petioles, buds, and lower sides of leaves with close, minute, drab, stellate hairs (sessile or shortly multiserial-stalked, porrect-stellate with medium central ray) sparse to absent and confined to main veins above, general aspect discolorous. Lower *leaves* to 12 x 6 cm, broadly elliptic, with 4 shallow lobes on each side, sinuses shallow and rounded, scarcely cut $\frac{1}{5}$ of way to mid-vein, later leaves 5-10 x 2.5-4 cm, elliptic, entire, base rounded or slightly oblique, apex acute to acuminate; petiole 1-1.5 cm long. *Inflorescence* a cyme of to 8 flowers, opposite a leaf or nearly so; peduncle 5-20 mm long, slender; floral rhachis to 1 cm long; lower flowers hermaphrodite; upper flowers male. *Hermaphrodite flower*: pedicel to 2 cm long. *Calyx* tube 2-3 mm long; lobes 1-3 mm long, lanceolate, sparsely pubescent, without prickles. *Corolla* to 2.5 cm diam., not reflexing fully, deeply stellate; lobes broadly lanceolate, separated for $\frac{3}{4}$ of length, white or faintly tinged blue, sparsely pubescent outside. *Filaments* (Fig. 162) about 1 mm long; anthers 5 mm long, tapered, erect in cone, tips slightly darkened. *Ovary* 1-1.5 mm diam., sparsely glandular hairy; style about 6 mm long, pale, erect, bent at apex; stigma capitate, greenish, equal to or scarcely exceeding anther pore. *Male flowers*: calyx 3-5 mm long, lobes very short and broad, acumen



Fig. 48. Holotype of *Solanum orbiculatum* Dunal ssp. *macrophyllum* Symon (*Smith-White s.n.*, ADW 33384).

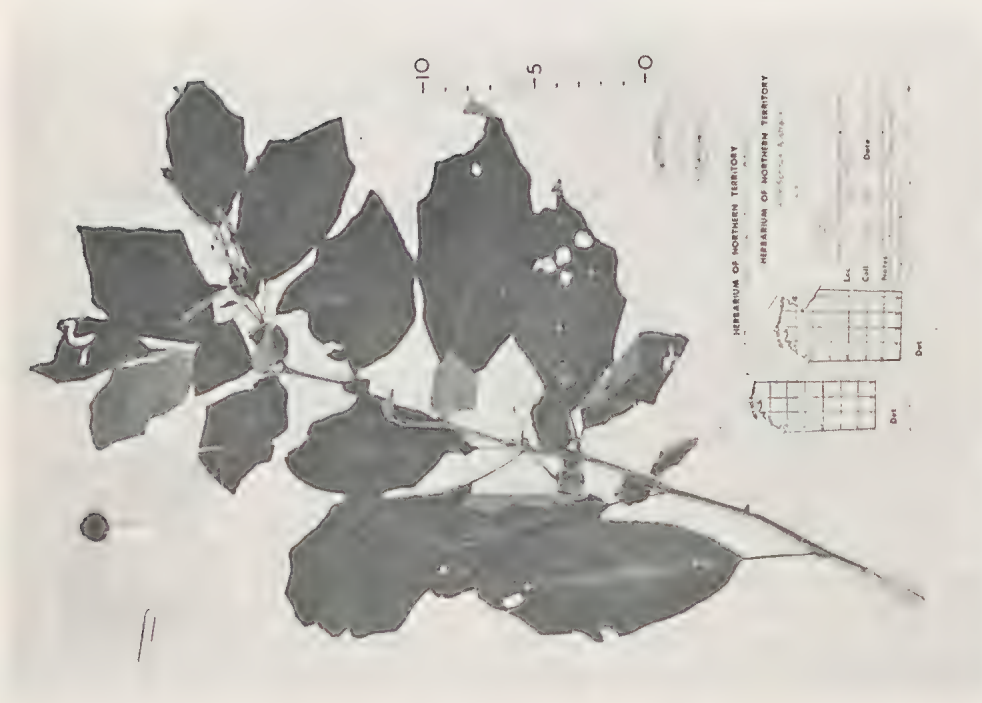


Fig. 47. Holotype of *Solanum yirrkalensis* Symon (Hinz 7633, NT).

0.5 mm long. *Corolla* 1-1.5 cm diam., deeply stellate, lobes acute. *Filaments* 1.5 mm long; anthers 5 mm long, lanceolate, loosely erect. *Ovary* including style, 3-5 mm long, vestigial. *Fruit* (Fig. 151) few in pendent cluster; peduncle scarcely enlarged; pedicels 1.5-2.5 cm long, slightly swollen towards apex; calyx scarcely enlarged; berry 1.5 cm diam., globular, red, succulent. *Seeds* 4-5 mm long, unevenly reniform, copiously hairy, with distinct narrow wing of hairs and membrane along outer rim of seed 0.5 mm wide. *Cotyledon* broad-lanceolate, 20 x 8 mm, first three leaves to 2 x 2 cm, ovate, fourth leaf undulate, slightly lobed. (Fig. 49.)



Fig. 49. *Solanum yirrkalensis* Symon. Drawn from pot grown plant from seed collected by N. Scarlett from Gove, NT (ADW 48657). Fruit from original collection (ADW 48443). $\times \frac{2}{3}$.

Chromosome number: $n = 12$ counted by D. Jewell (unpublished) on plants grown from the type collection.

Notes

Coming from a disturbed site close to gardens it could perhaps be an introduction but I have not been able to identify it with any other species. Its relationships are with the red-fruited species (*S. corifolium*) of the east coast, none of which extend as far west. With these species *S. yirrkalensis* shares pale stellate flowers, red fruits, a dark green aspect, discolorous leaves, and seeds similar to those of *S. discolor*. From them it differs in its broad leaves, white rather than pale blue flowers, and relatively large berries.

Distribution and habitat (Map 1)

N.T. only known from collections from the edge of vine forest on flat, red, sandy soil on the landward side of the coastal dune adjacent to the Yirrkala settlement gardens.

Specimens examined

NORTHERN TERRITORY: *Scarlett* 275, 14.i.1974. "Edge of vine forest at Gardens, Yirrkala". Plants have been grown from this collection and duplicates distributed (ADW); *White* Y40-74, 5.viii.1974, "Vine thicket near Yirrkala, fruits eaten by pigeons" (ADW); *Hinz* 7633, 27.ii.1976. "Edge of forest near Yirrkala, Gardens. Plant to 50 cm growing under trees on the south side of sand-dunes in brown sandy humic soil".—Type collection.

48. *Solanum discolor* R. Br., Prodr. (1810) 445.

Type citation: "(T.) v.v." T denotes Littus intra Tropicum, i.e. the coast of Queensland and the Northern Territory to Arnhem Bay.

Type material: A sheet at BM bears the Bennett number 2669 and the label "7 *Solanum discolor* prodr. 445 No. 5 descr Coen River Carpentaria Nov. 6 1802", (Coen River = Pennefather River). It is proposed as lectotype.

Solanum defensum F. Muell., Fragm. 5 (1866) 193.

Type citation: "Ad promontorium Cape York. E. Daemel".

Holotype: The sheet MEL 12284 bears the label, "*Solanum defensum* ferd. Mueller Cape York Ed. Daemel". On MEL 12285 are mounted 4 separate leaves with the label "*Solanum defensum* Cape York". There is an isotype at BM.

Literature

Brown (1810) 445; Dunal (1813) 183; Dunal in Poiret (1814) 777; Dunal (1816) 27; Don (1837) 424; Walpers (1844) 68; Dunal in DC. (1852) 293; Bentham (1868) 451; Mueller (1882) 96; Bailey (1883) 344; Ewart & Davies (1917) 242. As *S. defensum*: Bailey (1901) 1084; Bailey (1913) 354.

An erect *shrub* to 1 m, sparsely branched towards top; prickles to 7 mm long, fine, straight, frequent on stem and scattered on upper and lower leaf surfaces (fewer below); stems and petioles closely pubescent with minute stellate hairs (sessile, porrect-stellate with short central ray); leaves sparsely pubescent to glabrous above and below, with few hairs mainly along veins. *Leaves* 9-18 x 2-5 cm, lanceolate-elliptic, with 9-15 shallow, bluntly triangular lobes, sinuses shallow and rounded, cut one third or less of way to mid-vein, lobe apex rounded, leaf apex acute to acuminate, leaf base cuneate to rounded, petiole 1-2 cm long. *Inflorescence* a cyme of up to 12 flowers; peduncle 1-3 cm long; floral rhachis congested; pedicel 1-1.5 cm long, slender, lower flowers bisexual. *Calyx* c. 3 mm long; lobes 1-2 mm long, shortly and bluntly triangular, acumen 1 mm long. *Corolla* 1.5-2 cm diam., deeply stellate, lobes lanceolate (in cultivation with a twist towards the apex which makes them appear narrower), close to RHS Bishops Violet 34/2, a slightly deeper lilac stripe down the mid-petal. *Filaments* (Fig. 162) short; anthers 5-6 mm long, lanceolate, erect in cone. *Ovary* with a few stellate hairs towards apex; style c. 7 mm long,

erect, pale; stigma green. *Upper flowers* male, similar to lower flowers in size and appearance, ovary and style vestigial, 2 mm long. A single fruit seen, pedicel 2.5 cm long, thickened upwards, calyx lobes not much enlarged, both without prickles, *fruit* (Fig. 151) 1-1.5 cm diam., succulent, close to RHS 820, Blood Red. *Seeds* 3-4 mm long, angularly reniform, flattened, pale buff, reticulate, with minute narrow wing around outer margin of seed. (Fig. 50.)

Chromosome number: $n = 24$ pot grown from *Webb & Tracey 10975*, counted by D. Jewell (unpublished).



Fig. 50. *Solanum discolor* R. Br. Drawn from pot grown plant, from seed of *Webb & Tracey 10975*, collected from western shore of Lake Boronto, south of Somerset, Cape York, Qld (ADW 48381). $\times \frac{2}{3}$.

Notes

This species was rarely collected until 1969. Few collections are available and the range of variation within the species is not yet well understood. It is the most northerly of red-fruited group of species and may have links with species in Papua New Guinea.

Distribution and habitat (Map 3)

Qld, Cape York Peninsula.

Selected specimens (total seen about 12)

QUEENSLAND (all Cape York Peninsula): *Webb & Tracey* 9530, 1969, Lankelly Creek (ADW, CANB); *Webb & Tracey* 10975, 1974, shore of Lake Boronto (ADW, CANB and cult. BRI, K, MO); *Swan* 151, 1974, Iron Range (ADW); *Hyland* 8429, 1975, McIlwraith Range (ADW, FRI); *Hyland* 8936, 1976, Snake Creek and Bromley outstation (ADW, FRI).

49. *Solanum densevestitum* F. Muell. ex Benth., Fl. Austral. 4 (1868) 456.*Type citation:*

A. Queensland (1) Araucaria Ranges. *F. Mueller*, Dec. 1856. (MEL); (2) Upper Burnett River. *F. Mueller* (K); (3) Brisbane River, Moreton Bay. *F. Mueller* Dec. 1856 (MEL, K).

B. New South Wales (4) New England, *C. Stuart* (K); (5) Hastings River, *Beckler* (K); (6) Mt. Lindsay, *C. Moore* (NSW).

Lectotype: I propose the Brisbane River collection, MEL 12200, as lectotype.

Literature

Bentham (1868) 456; Bailey & Tenison-Woods (1879-80) 171; Mueller (1882) 96; Bailey (1883) 345; Moore (1893) 334; Bailey (1901) 1087; Dixon (1906) 222; Bailey (1913) 354; Maiden & Betche (1916) 181.

A leafy, bushy, clonal *shrub* to 1 m tall; prickles absent, all parts with dense tomentum of stellate hairs (sessile or short multiseriate-stalked, with very long central ray), hirsute-villous on twigs and young growths, sometimes shorter on upper leaf surface, general aspect green, leaves slightly discolourous. Juvenile *leaves* to 10 x 6 cm, with 5-6 very shallow rounded lobes, apex rounded, base cordate, oblique; adult leaves smaller, 3-6 x 1.5-3 cm, ovate to ovate-lanceolate, entire or with slightly undulate margin. *Inflorescence* a sessile cluster of 1-3 flowers, in an extra-axillary position; pedicel c. 1 cm long, slightly enlarged upwards. *Calyx* tube 2-3 mm long, open; lobes 5-12 x 3-5 mm, elliptic to oblong, leafy, unequal, venation conspicuous, apex blunt. *Corolla* 2.5-3 cm diam., broadly stellate, 4-5-partite, colour Campanula Violet RHS 37/1 fading to Sea Lavender Violet RHS 637/1. *Filaments* (Fig. 162) 2 mm long; anthers 4-5 mm long, attenuate, loosely erect. *Ovary* with glandular hairs towards summit; style about 7-8 mm long, exceeding anthers, slightly eccentric; stigma distinctly bifid, branches 0.5-1 mm long, green. *Fruit* (Fig. 151) 6-7 mm diam., globular, bright red, succulent, exceeded and largely covered by large almost leafy calyx lobes. *Seeds* 2 mm diam., pale or light yellow-brown, distinctly and minutely reticulate. Five fruits from the wild had a mean of 29 seeds each and 12 fruits from a cultivated plant had (6-) 21 (-35) seeds. (Fig. 51.)

Chromosome number: $n = 12$ Randell & Symon (1976); in addition Symon 4701 from Little Smokey, N.S.W. by B. Barlow (unpublished).

Notes

With its unarmed stems and soft green leaves this attractive species is less formidable than many. The bright red berries are substantially covered by the calyces. It is closely related to *S. nemophilum* F. Muell. which is perhaps its complement on the drier western slopes. The latter differs mainly in its smaller leaves and reduced calyces. Both form a distinctive pair of taxa amongst the red fruited species of eastern Australia.

Distribution and habitat (Map 1)

Southern Qld and north-western N.S.W., mainly in the McPherson—McLeay area of the east coast ranges. It is found in wet sclerophyll and rainforest margins on soils ranging from sands to basaltic.



Fig. 51. *Solanum densevestitum* F. Muell. Drawn from field grown plant at the Waite Institute, from seed from B. Whitehead, collected at Little Smoky, NSW (ADW 32978). $\times \frac{2}{3}$.

Selected specimens (total seen about 80)

QUEENSLAND: *Mueller s.n.*, Dec. 1856, Brisbane River (K, TCD); *Pedley 606*, 14.iv.1960, Upper Lacey Creek (BRI, K); *Tracey s.n.*, 5.vi.1969, Mt Glorious (ADW, B, CANB, K, US).

NEW SOUTH WALES: *Fraser 109*, 1818, New South Wales (BM); *Constable s.n.*, 28.iv.1956, Girard State Forest 1640, (BM, K, NSW); *Whitehead s.n.*, 31.viii.1965, Little Smoky (ADW & cult. to AAU, B, BRI, CANB, K, L, NSW, NT).

50. *Solanum nemophilum* F. Muell., *Fragm.* 2 (1861) 161.

Type citation: "In silvis Eucalypti crebrae (Ironbark forest) collium inter flumen Mackenzie et Dawson".

Lectotype: I propose the specimen MEL 12201 as lectotype with an isotype at K.
Solanum nemophilum var. *brachycarpum* Domin, *Biblioth. Bot.* 89 (1929) 1139.

Type citation: "Savannenwalder bei Pentland (Domin. 111.1910)".

Type specimen: PR 530903 and photo ADW. In addition to the herbarium label the sheet bears a handwritten label stating: "*S. nemophilum* v. *typicum* Folia sub acuta ovata-oblonga utrinque dense stellato-tomentosa, bacca calyx longior μ Mackenzie R. v. nova (cinerascens) indumento pauciori foliis \pm oblongis bacca minore, calyce . . ."

Literature

Bentham (1868) 456; Mueller (1882) 96; Tenison-Woods (1882-83) 308; Bailey (1883) 345; Bailey (1901) 1087; Maiden & Betche (1904) 747-48; Bailey (1913) 357; Ewart & Davies (1917) 243; Domin (1929) 1138; Webb (1948) 159; Webb (1952) 94.

A *shrub* 0.5-1.5 m high, sparsely branched, woody below; prickles generally absent, occasional on main stems, about 5 (-10) mm long, straight or slightly curved, sometimes dark tipped; all parts densely pubescent with stellate hairs (sessile or shortly multiseriate-stalked, porrect-stellate with short or medium central ray), general aspect drab green, slightly discolourous. *Leaves* (3-) 5 (-9) x (1.5-) 2 (-4) cm, lanceolate to elliptic, entire, apex acute, base rounded, often oblique; petiole (0.5-) 1 (-2.5) cm long. *Inflorescence* a small cluster or condensed cyme of 1-4 flowers, in an extra-axillary position, solitary flowers also occur; peduncle to 5 mm long; pedicel about 5 mm long. *Calyx* tube 2-3 mm long; lobes about 5 mm long, linear-oblong, slightly flattened, green. *Corolla* 2-2.5 cm diam., broadly stellate, purple-blue, interacuminal tissue scarcely equalling the acumens. *Filaments* (Fig. 162) 1-1.5 mm long; anthers 4 mm long, loosely erect. *Ovary* 1 mm long with few glandular hairs towards summit; style c. 7 mm long, weakly sigmoid; stigma, capitate. Fruiting peduncle and pedicel not much enlarged; *fruit* (Fig. 151) 5-8 mm diam., globular, bright red, succulent, calyx lobes longer than berry. *Seeds* about 2 mm, long, pale, minutely rugose. (Fig. 52.)

Chromosome number: $n = 12$ Randell & Symon (1976).

Notes

The name *S. nemophilum* F. Muell. was misapplied by Black (1957) 748 for some time to plants earlier named *S. centrale* J.M. Black, to which *S. nemophilum* is not closely related. *S. nemophilum* is most closely related to *S. densevestitum* from which it is sometimes difficult to distinguish. It differs from the latter in its generally smaller parts, denser tomentum and reduced calyx lobes.

Distribution and habitat (Map 15b)

Qld. In south-eastern Qld, on the western slopes of the Dividing Range it has been collected from the margins of vine forest, stony outcrops, on soils derived from both granites and basalts.

Selected specimens (total seen about 40)

QUEENSLAND: *Coveny* 1950, 25.viii.1969, 9 km SW of Warwick (ADW, BRI, NSW); *Moriarty* 1665, 1667, 1669, 25.iii.1975, State Forest 289, Yarraman (ADW, BRI, CANB).



Fig. 52. *Solanum nemophilum* F. Muell. Drawn from herbarium specimen, *Pedley* 789, from near Westmar, Qld (ADW 25660). $\times \frac{2}{3}$.

51. *Solanum elegans* Dunal in Poir., Encyc. Meth. Bot. Suppl. 3 (1814) 769.

Type citation: "Cette plante croit a la Nouvelle-Hollande. h. (Dunal, in herb. Mus. Paris.)" In Dunal (1852) 335 is added "In Novae Hollandiae ora orientali. (v.s. anno 1814, in h. Mus. Paris)".

Holotype: Not traced. There is at MPU in the Herb. Dunal an unpublished plate, Dunal, *Sol. ic. ined.* t. 58 (photo ADW), labelled *S. elegans* with no other information. Neither at MPU nor P did I find any sheets labelled as *S. elegans*. I propose this plate as the iconotype for *S. elegans* Dunal.

S. amblymerum Dunal in DC., Prodr. 13 (1852) 294.

Type Collection: "In montibus saxosis regionum interiorum Novae Hollandiae inter A. Cunn. no. 90 in herb. DC." (Macquarie River, N.S.W., A. Cunningham No. 90, 1822).

Holotype: G. Isotypes: BM, K.

Solanum violaceum var. *amblymerum* (Dunal) Maiden & Betche, Census N.S.W. Plants (1916) 181.

Literature

As *S. elegans*: Poiret (1814) 769; Dunal (1816) 35; Don (1837) 430; Walpers (1844) 78; Dunal in DC. (1852) 335.

As *S. amblymerum*: Dunal in DC. (1852) 294; Bentham (1868) 452; Bailey (1883) 344; Baker (1896) 458; Bailey (1901) 1084; Bailey (1913) 354; Webb (1949) 50.

An erect *shrub* to 1 m high, possibly clonal in habit; prickles 1-8 mm long, straight, pale or reddish, present on stems, petioles, upper and lower leaf surfaces and peduncles, largely absent from pedicels and calyx. *Leaves* pubescent with minute stellate hairs (porrect-stellate with long or short central cell), sparse above, dense and silvery below, leaves discolorous; juvenile leaves to 14 x 5 cm, with 3-4 shallow, blunt lobes towards base, apex rounded or acute, base truncate to cordate; petiole 2-4 cm long; adult leaves 4-6 (-10) x 1-1.5 (-2) cm, lanceolate, entire, or with blunt basal lobe or sinuate margin, apex rounded or acute, base equal or slightly oblique, cuneate, rounded or truncate; petiole 5-10 mm long. *Inflorescence* a 1-6 flowered cyme, from an extra-axillary position; peduncle to 1 cm long, short or sometimes absent; rhachis 1-10 mm long; pedicel c. 1 cm long, slender. *Calyx* tube 3 mm long; calyx lobes 2-3 mm long, attenuate-triangular. *Corolla* c. 3 cm diam., broadly stellate, lobes rounded, purple or heliotrope. *Filaments* (Fig. 162) 2 mm long; anthers 5-6 mm long, oblong. *Ovary* with few glandular hairs towards summit and at base of style; style 8-9 mm long, erect; stigma terminal. Fruiting pedicels 1.5 cm long, deflexed; calyx appressed, not much enlarged; *berry* (Fig. 151) 1-1.5 cm diam., globular, red at maturity. *Seeds* 3 mm diam., flattened, pale or light brown, minutely reticulate, 36 and 55 counted in two fruits. (Fig. 53.)

Chromosome number: unknown.

Notes

Dunal (1852) included both *S. elegans* and *S. amblymerum* in his monograph and did not consider them conspecific; he may not have been aware of their close relationship. Since his publication the name *S. elegans* has not been used and it is unfortunate to have to resurrect it. However, as *S. amblymerum* has not been used very widely it may not be too unpopular a change.

S. elegans is closely related to *S. parvifolium*, differing from the latter in the generally larger leaves, often with short, blunt basal lobes (particularly in juvenile phases), larger showy flowers and a larger berry. The plants are commonly 1 m tall and handsome in flower. There are some points of similarity with *S. brownii* but this is not known to have red or reddish fruits.

Distribution and habitat (Map 20b)

Southern Qld and northern N.S.W. It has been collected from open forest often on

hills, on rocky or boulder-strewn soils derived from granites and conglomerates.

Selected specimens (total seen about 60)

QUEENSLAND: *Clifford s.n.*, 23.ix.1969, Stanthorpe (ADW, CANB, K); *Moriarty 544*, Oct. 1970, 1 km N of Cottonvale (ADW, CANB).

NEW SOUTH WALES: *Constable 7090*, 23.viii.1966, Shiny Range S of Tenterfield (ADW, NSW); *Constable 6646*, 2.xii.1965, North Obelisk (ADW, NSW); *Pearce 88*, 18.ix.1976, 48 km along Bonshaw Road from turn-off on New England Highway N of Tenterfield (ADW, CANB, K, MO, NSW).



Fig. 53. *Solanum elegans* Dunal. Drawn from herbarium specimen, *Constable 6646*, from North Obelisk, 2 km west-south-west of Urbenville, NSW (ADW 33140). $\times 2/3$.

52. *Solanum chenopodium* F. Muell., Fragm. 2 (1861) 165.

Type citation: In locis arenoso-petraeis ad (1) flumen Darling, (*Beckler*) et (2) in montibus Barrier Range, *Beckler*; (3) ad montem Murchison, *Dallachy*; (4) ad rivum Stuarts Creek, *J. McD. Stuart*.

Type material: Several syntypes have been located. At K is a sheet of three collections of which the upper right, bears the label "No. 4 *S. chenopodium* F. Muell. *Solanum discolor* R. Br. (Muell.) Mr. McDougal Stuart's journey of 1859 to the interior of Australia". There are four sheets at MEL, (1) a scrappy piece with the label "Octob 28 1860 Near the Darling R. Sandy Soil. *Solanum chenopodium* ferd Muller. Bamsmora. Vict. Expd." (2) "Nov. 21 1860 *Solanum chenopodium*. Low Sandhills near R. Darling, Vict. Expd." (3) a sheet with two labels (a) "*Solanum chenopodium* F. M. Bamsmora, Vict. Exped." and (b) "Dec. 21 1860 *Solanum chenopodium* ferd. Near Barrier Range Dr. Beckler" and (4) "Sol. chenopodium Berry red. Corolla blue. Frut. erectus 2-3'. Mount Murchison & Darling. Dall.". I propose the last as lectotype.

Literature

Bentham (1868) 454; Mueller (1868) 146; Mueller (1882) 96; Tate (1890) 145; Moore (1893) 333; Turner (1897) 252; Koch (1898) 114; Maiden (1899) 625; Bailey (1901) 1086; Dixon (1906) 222; Bailey (1913) 354; Maiden & Betche (1916) 181; Ewart & Davies (1917) 242; Black (1921) 5; Black (1926) 497; Hurst (1942) 368; Webb (1948) 158; Schreiber (1954) 648; Everist (1974) 466.

An erect *shrub* 0.5-1 m tall, woody towards base, forming large or small colonies, sometimes dense; prickles to 1 cm long, straight or slightly recurved, scattered on stems, rarely dense or absent, less common on leaves and calyx; all parts pubescent with minute stellate hairs (sessile, porrect-stellate with short central ray), sparse above, dense below, general aspect discolorous. *Leaves* (3-) 6 (9) x (1.5) 3 (6) cm, variable depending on age and vigour, almost hastate, with 2-4 lobes towards base, lower pair of lobes short or rounded, second pair larger, bluntly triangular, sinuses rounded and shallow, apex rounded or acute; base oblique, cuneate, truncate or cordate; petiole (1-) 1.5 (-2) cm long. *Inflorescence* a short cyme of 3-8 flowers, 1-3 cm long, from an extra-axillary position; peduncle c. 5 mm long; floral rhachis 0.5-2.5 cm long; pedicels 5-6 mm long. *Calyx* tube 1-2 mm long; lobes 3-4 mm long, lanceolate, several sometimes partially fused, acumens 1-2 mm long. *Corolla* 1.5-2 cm diam., stellate, pale lilac or white, open or reflexed, petal acumens short and triangular. *Filaments* (Fig. 162) 1 mm long; anthers 4-5 mm long, oblong, loosely erect; with glandular hairs towards summit. *Style* erect, c. 8 mm long, projecting 2-3 mm beyond anthers, slightly thickened upwards; glandular hairy below; stigma capitate, green. Fruiting peduncle, pedicel, and calyx not much enlarged, (calyx lobes to 4 mm long); *fruit* (Fig. 151) 5-9 mm diam., globular, at maturity bright shiny red, succulent, finally almost black when dry, little flesh enclosing seeds. *Seeds* 3-4 (5) mm long, rather large for size of berry, thin, often twisted or bent, pale or distinctly yellow. The seed contents of 32 fruits range from 4 to 16 with a mean of 9, (one of lowest seed numbers per fruit of Australian *Solanum*). *Cotyledons* 15-20 x 5 mm, lanceolate; hypocotyl, petiole and cotyledons all minutely glandular hairy, first true leaf ovate to orbicular, entire, almost glabrous, but with glandular, ciliate margin. (Fig. 54.)

Chromosome number: $n = 12$ Randell & Symon (1976).

Notes

This species belongs to the red-fruited group of taxa the centre of speciation of which is on the east coast of Australia. With *S. ferocissimum*, *S. chenopodium* extends into the arid areas and its distribution suggests that it is a relict species. It is most closely related to *S. elegans* from which it differs in its smaller parts, more stellate corolla and paler or white flowers.

Distribution and habitat (Map 11)

A disjunct distribution in N.T., Qld, N.S.W. and S.A., growing in sandy soils and in alluvial banks in dry creeklines. It is noteworthy that many collectors report it growing in the shelter of shrubs or under the shade of trees.



Fig. 54. *Solanum chenopodium* F. Muell. Drawn from pot grown plant at the Waite Institute, from Symon 5972, from Four Mile Creek, 37 km west of Old Moolawatana Bore, SA $\times \frac{2}{3}$ (ADW 42128, fruit from ADW 34930). $\times \frac{2}{3}$.

Selected specimens (total seen about 60)

NORTHERN TERRITORY: *Chippendale s.n.*, 8.ix.1955, Window Hill, Simpson Desert (ADW, BRI, CANB, NSW); *Nelson 1630*, 7.ii.1968, Temple Bar Crossing, 16 km SW of Alice Springs (AD, ADW, DNA, NT, PERTH).

QUEENSLAND: *Everist 4025*, 17.vi.1947, Currawilla (BRI); *Everist 5743*, 12.x.1955, Thylungra (BRI).

NEW SOUTH WALES: *Dallachy & Goodwin s.n.*, Darling River (CGE, E, K, TCD); *Morris s.n.*, 26.ix.1921, Mt Sturt Stn (AD, ADW, NSW); *Constable s.n.*, 24.xi.1947, Mundi Mundi Stn near Silverton (NSW).

SOUTH AUSTRALIA: *Kock s.n.*, June 1899, Tower Gap, Mt Lyndhurst (AD, K); *Symon 5972*, 23.viii.1968, Four Mile Creek, 21 km W of Old Moolawatana (ADW, B, CANB, K).

Section 19. *Oliganthes* (Dunal) Bitt., Repert. Spec. Nov. Regni Veg. Beih. 16 (1923) 1.

Basionym: *Oliganthes* Dunal in DC., Prodr. 13 (1852) 30, 282, grad. ambig.

Lectotype: *S. indicum* L., Seithe (1962) 300.

The species are mostly small, prickly shrubs, sub-shrubs or herbaceous perennials; many are clonal in habit. A stellate-haired tomentum is often abundant, the leaves may be entire or lobed and are of moderate size. The inflorescence is a few flowered (1 ± 20), mostly simple, racemose cyme in an extra-axillary position. The corolla may be broadly stellate to rotate and the anthers lanceolate, opening by terminal pores. The berry may be mucilaginous, succulent or dryish to hard and bony but most are yellowish in colour.

This large section occurs in Africa, Australia and North and South America.

A number of series have been named by Bitter (1923:3-139). No Australian species were included there. While there may be some utility in grouping together numbers of allied species the taxonomic hierarchy of these groups is dubious until a better overall subgeneric structure is available.

I believe the two alien species *S. elaeagnifolium* and *S. dimidiatum* established in Australia belong here, though these two have at times even been put in different sections, *Leprophora* and *Lathyrocarpum* respectively. I do not see them worthy of separation at that rank. Both these sections, plus *Oliganthes* itself and *Torva*, are included in section *Melongena* by D'Arcy (1974) a lumping that goes to an opposite extreme. The Australian species No. 55-99 have been arranged so that, as far as possible, related species are placed close together.

*53. *Solanum dimidiatum* C.S. Rafin., Aut. Bot. 8 (1840) 107.

Type citation: "Texas, New Mexico, Arkansas."

Type material: Not seen, possibly destroyed, D'Arcy (1974) 844 does not mention any lectotype.

Literature

D'Arcy (1974) 844.

A clonal herbaceous *perennial* to 50 cm, reproducing freely from extensive underground root system; stems erect or sprawling, somewhat sparsely branched; prickles to 7 mm, straight, pale, few (the original specimen from Bundaberg is almost unarmed with no prickles longer than 2 mm, specimens cultivated at Adelaide have more and longer prickles), chiefly on mid-rib below and petiole, few on stem; all parts pubescent with tomentum of close, minute, stellate hairs (sessile or short multiseriate-stalked, porrect-stellate, with medium length central ray), general aspect green, only slightly discoloured. *Leaves* 5-12 x 3-6 cm, ovate to broad-lanceolate in outline, with about 7 broadly triangular lobes, sinuses rounded, rarely cut more than half way to midvein, lobe apex rounded or acute, sometimes with small secondary lobe or the margin undulate, leaf apex acute or acuminate, base cuneate to truncate; petiole 1-4 cm long.

Inflorescence a racemose cyme, simple or often forked, with few to 15 flowers, from an extra-axillary position; peduncle (to fork) c. 2 cm long; floral rhachis c. 2-5 cm long, pedicel 1 cm long. *Calyx* tube c. 5 mm long; lobes 1-2 mm broadly triangular, with an acumen of 2-3 mm. *Corolla* 3-4 cm diam., broadly stellate, lobes triangular, colour close to RHS Sea Lavender Violet 637. *Filaments* (Fig. 166) 1-2 mm long, relatively short and stout; anthers 5-7 mm long, tapered upwards, loosely erect in cone. *Ovary* globular, glabrous or with a few glandular hairs; style 5-9 mm long, erect, projecting c. 5 mm beyond anther tips; stigmatic surface oblong, green. Fruiting pedicels curvedly deflexed,



Fig. 55. *Solanum dimidiatum* C.S. Rafin. Drawn from plant grown from roots collected at Bundaberg, Qld (ADW 46241). $\times 2/3$.

slightly thickened and lengthened; calyx covering base of fruit but not much enlarged; fruit (Fig. 156) 1.5-2 cm diam., globular, firm, mucilaginous, finally yellow. *Seeds* about 2.5-4 mm long, pale buff, rather thin, twisted in local material and possibly infertile, about 32 seeds counted in one fruit. (Fig. 55.)

Chromosome number: $n = 36$ P. Sharp (1978, unpublished), ADW 46241.

Notes

This is one of the most recent *Solanum* introductions recorded in Australia and efforts are being made to exterminate the colony. The species is native to southern U.S.A. (Texas and Oklahoma to Georgia and Florida) and is closely related to *S. carolinense* L. Horse Nettle, a well known weedy species in southern U.S.A. These two species have long been confused. It is known that widespread weedy species are often rather variable and this combined with clonal propagation, which allows even infertile variants to survive and spread, may account for the occurrence of distinct populations and intractable species complexes. Mr D.F. Blaxell, when Australian Botanical Liaison officer at Kew, was not able to separate the two species satisfactorily on the collections available there and for some time I considered the Australian material as a local variant of *S. carolinense*, particularly as our material does not have the "hard almost woody pericarp enclosing a stony endocarp" of D'Arcy's description of the fruit of *S. dimidiatum*. The chromosome number for *S. carolinense* of $n = 12$, D'Arcy (1969) contrasts markedly with $n = 36$ for *S. dimidiatum*, D'Arcy (1969) and our material, and this combined with numerous but minor differences between our clone and the 15 sheets of authentic *S. carolinense* available here have persuaded me to use the name *S. dimidiatum* rather than *S. carolinense*.

Distribution and habitat

Originally native to southern eastern U.S.A., in Australia confined to a localised sugar cane growing area at Bundaberg.

Specimens examined (all cited)

QUEENSLAND: *Arnold s.n.*, 1963, Bundaberg (BRI); *Draper s.n.*, 1966, Bundaberg (BRI); *Draper s.n.*, 1972, Bundaberg (ADW, BRI) and plants grown from this collection have been distributed to AD, BRI, CANB, K, MO.

*54. *Solanum elaeagnifolium* Cav., Icon. 3 (1795) 22, t. 243.

Type citation: "Habitat in America caldiore, 4 Floret a Julio usque ad Octob. in Regio horto Matritensi".

Type material: Probably Madrid (MA). Not seen, D'Arcy (1974) also gives C, P-Juss.

None of the following names have been used to any extent in Australia. In view of the importance of *S. elaeagnifolium* as a weed I thought it would be useful to have them collected together.

Solanum leprosum Ort., Nov. rar. pl. Hort. Matrit. Dec. 9 (1800) 115.

Type citation: Cultivated in Madrid from seed sent from Chile.

Type material: Not seen, possibly MA. Dunal cites isotype in G, Herb DC. Microfiche AD. There is also an unpublished plate for Dunal t. 12 at MPU, photo ADW.

Morton (1976:223-225) maintains *S. elaeagnifolium* var. *leprosum* for the species in Argentina. He considers that the South American plants have a closer, denser, more lepidote pubescence, more deeply lobed leaves, fewer flowers per inflorescence, the style and stigma less pubescent and the plants distinctly more prickly. However, the collections at K, alone, show that many variants widely different from var. *leprosum* occur in South America, some of them with almost entire, markedly narrow leaves, and with few prickles. Forms similar to var. *leprosum* also occur in North America e.g., *Nelson 1651*, Tucson, Arizona (K), and *Zuck s.n.*, 1896, Holbrook, Arizona (K), and in Australia.

Solanum obtusifolium Dunal, Solan. syn. (1816) 26.

Type citation: "Hab. in Mexico, (v.s.h. H. et B)" (Dunal Sol. ed 2. ined. t. 119*).

Type material: At MPU is the unpublished drawing referred to and attached to the sheet is a leafy shoot with the label: "DC, Herb. Dunal *Solanum obtusifolium* Dun.? Kunth Syn. ?char. Nov. Gen. Intr. in . . . Valparaiso 1824 - . . . 1826 & 1929", Photo ADW. The specimen has narrow leaves with an undulate margin.



Fig. 56. *Solanum elaeagnifolium* Cav. Drawn from a plant collected by J. Carpenter from a park at Col. Light Gardens, Adelaide, SA (ADW 40789). $\times \frac{2}{3}$.

Solanum saponaceum Hook., Bot. Mag. (1826) t. 2697.

Type citation: "Introduced to the Horticultural Society of London by Mr. M'Rae from Chile, and to the Botanic Garden of Glasgow from Mendoza by Dr. Gillies. Our dried specimens in the Herbarium are from this gentleman, gathered in November 1820 near Rio Saladillo, and the remark is added that "it is the same species which is common all over Mendoza" . . .

Type material: At K is a sheet of 5 pieces collected "Buenos Aires May 1820" by Gillies or Tweedie. Some are prickly, some unarmed and one looks like the illustration. Their status is not clear and the plate may be the iconotype.

S. flavidum Torr., Ann. Lyceum Nat. Hist. New York 2 (1828) 227.

Type citation: "The exact locality of this plant is not recorded". The description was based on plants collected by E.P. James on a journey to the Rocky Mountains.

Type material: Not seen, D'Arcy (1974:847) cites "Western United States, James 309, NY".

S. dealbatum Lindl., Trans. Hort. Soc. London 7 (1830) 52, a renaming of *S. saponaceum* Hook., non Dunal.

S. texense Engelm. & Gray, Boston J. Nat. Hist. 5 (1845) 227.

Type citation: "Roadsides, prairies, etc. Houston to Brazos. June-September. (This is also No. 200 of Drummonds Third Texan Collection. We likewise have specimens from Dr. Wright)".

Type material: D'Arcy (1974) 847, cites "Texas, Lindheimer 135 (= Drummond 200) (K & MO)". The specimen at K has been seen, as has the Wright collection at K. They are without prickles.

S. roemerianum Scheele, Linnaea 21 (1848) 767.

Type citation: "Prope Austin. April. Römer".

Type material: Not seen.

S. elaeagnifolium Cav. var. *leprosum* (Ort.) Dunal in DC., Prodr. 13 (1852) 291.

S. elaeagnifolium Cav. var. *obtusifolium* (Dunal) Dunal in DC., Prodr. 13 (1852) 291.

S. elaeagnifolium Cav. var. *grandiflorum* Griseb., Abh. Konigl. Ges. Wiss. Gottingen. 24 (1879) 255.

Type citation: "Catamarca, Argentina, Nov. 1872 Lorentz & Hieronymus 1243".

Type material: Not seen, Morton (1976:223) cites specimen at CORD. There are also Lorentz & Hieronymus collections at K but they differ in collection details.

S. elaeagnifolium Cav. var. *argyrocroton* Griseb., l.c.

Type citation: "Between La Oiada and La Linea, frontier of Tucuman and Salta, Argentina, Feb. 1873. Lorentz & Hieronymus 533".

Type material: Not seen, Morton l.c. cites specimen at CORD.

S. elaeagnifolium Cav. var. *albiflorum* Cockerell, Bull. Torrey Bot. Club 20 (1893) 410.

Type citation: "I found 6-7 plants of this pretty form at El Paso Texas, growing close together . . ."

Type material: Possibly US, not seen.

S. elaeagnifolium Cav. var. *angustifolium* Kuntze, Rev. gen. pl. 3 (1898) 225.

Type citation: "Argentina: San Rafael, Provinz. Santiago".

Type material: Not seen, Morton l.c. cites specimen at NY.

S. elaeagnifolium Cav. var. *ovalifolium* Kuntze, l.c.

Type citation: "Argentina, Salta, Monte Morro".

Type material: Not seen, Morton l.c. cites holotype at NY and isotype at US. However, he considers the name a synonym of his new species *S. conditum* Morton. The line illustration of *S. conditum* shows a relatively broad-leaved plant, and he considers that *S. elaeagnifolium* var. *ovalifolium* Kuntze and *S. juvenale* Thell. are related.

S. elaeagnifolium Cav. forma *benkei* Standl., Rhodora 34 (1932) 176.

Type citation: "Texas: Near mouth of the Rio Grande about Brownsville, rare, March 20, 1930 Benke 5209 (Herb. Field Mus. type)".

Type material: Not seen. This name applies to a white-flowered form and Standley comments "plants with white corollas occur not infrequently".

Literature

Due to its importance as a weed there is now a rapidly growing agronomic literature on this species. Dunal (1813) 181; Poirét (1814) 762; Dunal (1816) 26; Sims (1826) t. 2697 as *saponaceum*; Don (1837) 423; Walpers (1844) 67; Dunal (1852) 290; Tovey (1909) 24; Blakely (1923a) xxx; Blakely (1923) 489; Ewart (1931) 1006; Boughton (1940) 236; Vartak (1957) 965 as *esuriale*; Buck *et al.* (1960) 348; Tideman (1960) 329-331; Cabrera (1965) 204; Maiti & Mathew (1967) 126; Patil (1969) 142; Willis (1972) 552; Parsons (1973) 268-270; Vidhyasekavan *et al.* (1973) 804; D'Arcy (1974) 847; McKenzie & Douglas (1974) 1-19; Everist (1974) 467; Smith (1975) 35; Lamp & Collett (1976) 301; Morton (1976) 222; Cuthbertson *et al.* (1976) 11.

Common name: silver leaf nightshade, white horse nettle.

An erect, clonal, herbaceous *perennial* to 1 m, often 40-60 cm high, extensive underground root system producing usually annual vegetative growth; stems erect, branching towards top; prickles 2-5 mm long, straight, fine, often reddish, usually present on stems, less often on petioles and leaves, plants sometimes nearly free of prickles; all parts covered with close, dense, tomentum of stellate hairs, (sessile or shortly multiseriate-stalked, porrect-stellate with medium or long central ray), general aspect silvery-green, rarely rusty, slightly discolourous. Lower leaves c. 10 x 4 cm, oblong-lanceolate, distinctly sinuate-undulate, upper leaves smaller, oblong, entire, venation usually prominent in dried specimens, base rounded or cuneate, apex acute or obtuse; petiole 0.5-2 cm long, with or without prickles. *Inflorescence* a few (1-4)-flowered raceme, at first terminal, soon lateral; peduncle 0.5-1 cm long; floral rhachis 2-3 cm long; pedicels 1 cm long at anthesis, reflexed and lengthened to 2-3 cm long in fruit. *Calyx* c. 1 cm long at anthesis; tube 5 mm long, more or less 5 ribbed by nerves of 5 subulate lobes, whole enlarging in fruit. *Corolla* 2-3 cm diam., rotate-stellate, often reflexed, blue, rarely pale blue, white, deep purple, or pinkish. *Anters* (Fig. 162) 5-8 mm long, slender, tapered towards apex, yellow, conspicuous, erect, not coherent; filaments 3-4 mm long. *Ovary* pubescent towards summit; style 10-15 mm long. *Fruit* (Fig. 155) 8-14 mm diam., globular, first marbled green, later greenish-yellow to orange-brown, usually firm, not succulent. *Seeds* 3 x 2 mm diam., flat or biconvex, light brown, smooth. (Fig. 56.)

Chromosome number: $n = 12$ Randell & Symon (1976) and $n = 12$, $n = 36$ Fedorov (1969).

Notes

Considerable variation occurs in this species. In Australia deep purple, pale purple, mauve-pink and white flowered forms occur. The name *S. leprosum* was used for plants that have more prickles and markedly sinuate-undulate leaves; these are somewhat distinctive and occur in Australia. Other variants differ in height and branching patterns, density and colour of the tomentum. Examination of specimens from both North and South America at Kew show that a great range of variation is present there and exceeds that so far collected in Australia. The situation is similar to many other weedy species and the facility for clonal reproduction enables many variants to persist. A close comparison can be made with *S. carolinense* L. in this respect.

No varietal names have been used by recent American authors except Morton (1976) who maintains *S. elaeagnifolium* var. *leprosum* for the species in Argentina. However, examination of South American collections shows a range of variants to many of which the name var. *leprosum* cannot be applied with accuracy. Morton states that South American material differs from North American in having closer pubescence on the vegetative parts, in general smaller leaves, somewhat stronger prickles on the stems leaves, ovary, and style almost glabrous. This combination of characters is by no means regular in Australian collections, and, in view of the fact that we do not know at present where the Australian material came from, the application of varietal names seems of little use. In Australia both *S. esuriale* and to a lesser extent *S. ellipticum* were confused with *S. elaeagnifolium* until the weedy nature and widespread occurrence of the pest was

recognised. The most useful single character to separate the alien from the native species is its relatively long anthers (to 8 mm), but the alien also differs in its relatively erect habit, branching above, silvery tomentum, reddish needle-like prickles, broadly stellate corolla and depressed globular berry.

Distribution and habitat (Map 10)

Originally native to the southwestern U.S.A., and temperate South America it has now been introduced to Europe, Asia, Africa and Australia. All the southern Australian States have well established colonies primarily in the cereal growing areas. Detailed accounts of distribution are available for some states.

Selected specimens (total seen about 150)

WESTERN AUSTRALIA: *Anon s.n.*, 1950, Burakin (PERTH); *Royce 8123*, 27.ii.1964, Muresk (PERTH).
NORTHERN TERRITORY: *Mitchell s.n.*, 3.ii.1977, Alice Springs (AD, NSW, NT).
QUEENSLAND: *Shire Clerk s.n.*, 30.xii.1942, Warwick (BRI); *Noffke s.n.*, Feb. 1965, S.W. of Laidley (BRI).
NEW SOUTH WALES: *Brown s.n.*, 2.ii.1906, Raymond Terrace district (NSW); *Godden s.n.*, Feb. 1955, Culcairn (NSW).
VICTORIA: *French s.n.*, Feb. 1905, Victoria (NSW); *Muir 3168*, 20.i.1964, Corio Bay (MEL).
SOUTH AUSTRALIA: *Black s.n.*, 7.iii.1918, Brougham Place, Adelaide (AD); *Howard s.n.*, 23.i.1967, Struan Res. Centre (ADW, CANB, DAV, NSW).

55. *Solanum orbiculatum* Dunal in Poir., Encyc. Meth. Bot. Suppl. 3 (1813) 762, subspecies *orbiculatum*.

Type citation: "Cette belle espèce est originaire de la Nouvelle-Hollande \bar{h} (Dun. in herb. Mus. Paris)".

Type material: Several syntypes have been located. At P are at least 8 sheets variously labelled (1) "Herb. Rickard *S. orbiculatum* Dunal Nlle Holl." (2) "Herb. Rickard *Solanum* Nlle Holl. Cote Occid. 1822" (3) "*Sol. orbiculatum* n. Holl. Dnls!" (4) "*S. orbiculatum* Prodr. 687 Dnls! nles Holl. asterotrichum oliganthes" (5) "*Sol. orbiculatum* Dunal N. Holl. ora occident. Voy du Capitaine Baudin 1801 Nouv. Hollande" (6) a second sheet of number 5 (7) "*Sol orbiculatum* Dnls! N. Holl. Baie du Geographe" (8) "*S. orbiculatum* Dnls Prodr. no 687, C Gaudichaud N. Holl. Baie du Chien Marins." I propose the last as lectotype.

At MPU is an unpublished plate labelled "*Solanum orbiculatum* t. 44" (photo ADW), and attached to the sheet is a small specimen labelled (a) "*S. orbiculatum* Dunal 1814" and (b) "Herb DC 1844". The plate is cited by Dunal (1852) 292 as "*Sol. ic. ined. t. 44*".

At BM is a sheet labelled "Cote ouest de la Nlle Hollande Baie de Chiens Marins 1801."; isoelectotype.

At K is a sheet labelled "*S. orbiculatum* Dunal voy. du Capitaine Baudin 1801 N. Holl. ex Herbario Parisiensis"; probable isoelectotype.

At G is a sheet labelled "*S. orbiculatum* Gaudichaud Baie de Chien Marins" and '60'; isoelectotype.

Literature

Dunal (1816) 27; Don (1837) 424; Walpers (1844) 67; Dunal in DC. (1852) 292; Bentham (1868) 453; Mueller (1868) 145; Mueller (1882) 96; Tate (1890) 145; Mueller & Tate (1896) 373; Bailey (1901) 1085 as *S. oligacanthum*; Black (1926) 497; Ising (1937) 221; Cleland & Tindale (1959) 123; Grieve & Blackall (1975) 600.

An erect or rounded, sparsely clonal *shrub* 0.5-1.5 m; prickles 5-10 mm long, firm, straight or slightly curved, on stems only, not dense, c. 1 per cm of stem, sometimes absent; all parts pubescent with close, dense, rusty or silvery stellate hairs (typically sessile, porrect-stellate with short central ray, but short multiseriate-stalked porrect-

stellate with long central ray occur on some plants), general aspect pale or rusty, leaves not discolorous. *Leaves* 1.5-3.5 cm diam., orbicular or slightly ovate, entire, apex rounded, base broadly cuneate or rounded; petiole 5-10 mm long. *Inflorescence* a 2-4-flowered cyme in an extra-axillary position, solitary flowers also occur; peduncle to 1 cm; floral rhachis 3-5 mm long. *Calyx* tube 3-4 mm long, campanulate; lobes 1-2 mm long, broadly and bluntly triangular. *Corolla* 2-2.5 cm diam., stellate, often deeply so; lobes lanceolate, Sea Lavender Violet RHS 637 to Aster Violet RHS 38/1. *Filaments* (Fig. 163) short; anthers 6-7 mm long, distinctly tapered towards apex, loosely erect.



Fig. 57. *Solanum orbiculatum* Dunal ssp. *orbiculatum*. Drawn from pot grown plant at the Waite Institute, from Symon 3420, collected on Commonwealth Hill Stn, 29 km west of Mt Christie, SA (ADW 43251, fruit from ADW 29149). $\times 2/3$.

Ovary glabrous, style erect, stigma purplish-green. Peduncle firming in fruit; pedicels usually deflexed, calyx appressed; scarcely enlarged, lobes to 5 mm long, apices acute; *fruit* (Fig. 152) c. 1.5 cm diam. first marbled light and dark green, finally pale yellowish-ivory, somewhat translucent, succulent, brownish when dry. *Seeds* 3 mm long, pale or light brown, minutely reticulate towards margin, 10 fruits of *Symon 5473* had (24-) 40 (-47) seeds per fruit. *Cotyledons* about 17 x 5 mm, lanceolate, first leaf 16 x 12 mm, oval-ovate, no prickles visible in early stages. (Fig. 57.)

Chromosome number: $n = 12$ Randell & Symon (1976); in addition *Symon 4699* & *5440*, a collection *Ashby s.n.*, Yuna, W. Aust., and plants from seed from Kings Park Garden 343/66 have all been counted as $n = 12$.

Notes

The species varies in the closeness and density of the tomentum, whether grey or rusty and there is a cline in leaf size with smaller silvery leaves near the west coast of W.A. gradually becoming larger inland. The species is closely related to *S. nummularium* from which it differs in its less intricate habit, larger leaves and generally pale rather than intense rusty tomentum. It is probable that *S. nummularium* has evolved from ancestral *S. orbiculatum*.

The subspecies described below differs not only in its size and leaf characters but also in its ecology.

Distribution and habitat (Map 10)

W.A., N.T. and S.A. Widespread in W.A. below the Hammersley Ranges from the arid central coastline to the central Australian ranges and as far east as Wynbring in S.A. In W.A. on coastal dunes, gravelly and sandy plains, in central Australia and in S.A. on low red sandy dunes.

Selected specimens (total number seen about 140)

WESTERN AUSTRALIA: *Gaudichaud s.n.*, 1801, Baie du Chien Marins (G, P, BM); *Speck 962*, 15.vii.1958, Mileura (CANB, NSW, PERTH); *Symon 5441*, 3.vii.1967, 58 km S of Carnarvon (AD, ADW, B, CANB, HUI, K, NSW, PERTH, US).

NORTHERN TERRITORY: *Symon 10379*, 10.vi.1975, 26 km S of Aileron (ADW, B, L, MO, NT); *Chippendale s.n.*, 9.ix.1960, Desert Bore, Mt Allan (ADW, NT); *Latz 1976*, 13.i.1972, Yuendumu Reserve (ADW, NT).

SOUTH AUSTRALIA: *Shilling 38*, 10.ix.1957, Maralinga (AD, BRI, K, NSW); *Symon 3420*, 21.ii.1965, 29 km W of Mt Christie (ADW, BIRM, CANB, K); *Lay 489*, 26.ix.1971, 60 km NW of Wynbring (AD, MO).

55a. *Solanum orbiculatum* Dunal subspecies *macrophyllum* Symon, ssp. nov.

Suffrutex 1-1.5 m, similis ssp. *orbiculato*; folia certe ovatoria, maiora 3-6 x \pm 2.5 cm, griseo-viridia, raro ferruginea; tomentum laxum pilorum stellatorum. Aculei usque 1 cm longi, sparsim in caule dispersi, minime recurvati.

Type collection: *S. Smith-White s.n.*, Aug. 1967, Dean Ranges, W. Aust.

Holotype: ADW 33384 (Fig. 48).

A shrub 1-1.5 m, similar to ssp. *orbiculatum*, but leaves distinctly more ovate, larger, 3-6 x \pm 2.5 cm, grey-green in colour, rarely rusty, with looser tomentum of stellate hairs, (sessile to long multiseriate-stalked, porrect-stellate with short to long central ray). Prickles to 1 cm long, sparsely scattered on stems, slightly recurved. (Figs 58 and 152.)

Chromosome number: $n = 12$, counted by B. Randell (unpublished), voucher *Barlow 1149* (ADW).

Notes

Small leaves, twiggy and inadequate specimens may be difficult to separate from the typical subspecies. Almost all collections with habitat data suggest that it is largely

confined to rocky sites. It is ecologically separated from the other inland collections of *S. obiculatum* which are usually found on sandy sites.

Distribution and habitat

The subspecies is confined to the western parts of the central Australian ranges. It is largely confined to rocky sites.



Fig. 58. *Solanum orbiculatum* Dunal ssp. *macrophyllum* Symon. Drawn from a herbarium specimen collected by S. Smith-White from the Dean Ranges, WA (ADW 33384). $\times \frac{2}{3}$.

Selected specimens (total seen 20)

WESTERN AUSTRALIA: *Latz* 2377, 9.iv.1972, Walter James Range (ADW, NT); *George* 8853, 21.vii.1967, Rawlinson Range (ADW, PERTH); *Carolyn* 6122, 5.viii.1967, S end of Dean Range (ADW, SYD).

NORTHERN TERRITORY: *Beauglehole* 24111, 19.vii.1967, Annabella Gorge (acb, ADW); *Symon* 10384, 11.vi.1975, 13 km N of Hugh River crossing (ADW, B, L, MO, NT).

56. *Solanum nummularium* S. Moore, J. Linn. Soc. Bot. 34 (1898) 205.

Type citation: "Growing between Gibraltar and Coolgardie, Western Australia, Sept. 1895, S. Moore".



Fig. 59. *Solanum nummularium* S. Moore. Drawn from pot grown plant at the Waite Institute, from *Symon* 5478, collected on the outskirts of Kalgoorlie, WA (ADW 42318). $\times 2/3$.

Holotype: BM.

Literature

Grieve & Blackall (1975) 600.

An erect or rounded, intricate, prickly *shrub* 0.5-1 m tall, woody at base, sparingly clonal; *prickles* 5-10 mm long, rigid, straight or slightly recurved, often dark and reddish, conspicuous on stems, often paired or nearly so as pseudo-stipules, absent from peduncles, petioles and leaves; all parts densely and closely pubescent with pale or rusty stellate hairs; (sessile or shortly multiseriate-stalked, porrect-stellate with short or medium central cell) less abundant on upper leaf surface, general aspect usually rusty, leaves somewhat discoloured. *Leaves* 4-10 mm diam., orbicular to broad-orbicular, (one of the smallest-leaved Australian species of *Solanum*), apex and base rounded; petiole 2-4 mm long. *Inflorescence* a short 1-2-flowered cyme, or solitary pedicellate flower; peduncle to 5 mm long; pedicel 3-6 mm long. *Calyx* 2-3 mm long, campanulate, almost truncate; lobes 0.5-1 mm long, broadly triangular. *Corolla* deeply stellate, often strongly reflexed, lobes 6-10 mm long, purple-blue. *Filaments* (Fig. 163) 1 mm long; anthers 5 mm long, oblong-attenuate, conspicuously and divergently erect. *Ovary* with few glandular hairs; style 5-8 mm long, erect, slightly hooked; stigma, capitate, green. Fruiting pedicels 1 cm long, curvedly deflexed; *fruit* (Fig. 152) 1-1.5 cm diam., succulent, finally translucent, yellow, shed when ripe. *Seeds* 2.5-3 mm diam., pale buff, (15-) 22 (-23) in six fruits examined. Cotyledons 15 x 5 mm, lanceolate, very sparsely glandular-ciliate, first true leaf orbicular; 1-1.5 cm diam., with stellate hairs. (Fig. 59.)

Chromosome number: $n = 12$ Randell & Symon (1976).

Notes

This species may vary in having grey-green rather than rusty tomentum and in having forms with larger leaves. Both variants link it with *S. orbiculatum* with which it is closely related, and from which it differs by its intricate habit, small leaves and usually rusty tomentum.

Distribution and habitat (Map 5)

W.A., in the southern arid regions of the eastern goldfields. It occurs on sandy plains and rocky rises.

Selected specimens (total seen about 55)

WESTERN AUSTRALIA: *Helms s.n.*, Mch 1899, Coolgardie (BM, BRI, K); *Symon 5455*, 4.vii.1967, E of Pindar (ADW, B, K, NSW, PERTH, US); *Symon 5478*, 6.vii.1967, Kalgoorlie (ADW, B, CANB, K, PERTH, US); *Howard s.n.*, 1968, N of Wubin (AAU, ADW, CANB, PERTH).

57. *Solanum oldfieldii* F. Muell., *Fragm.* 2 (1861) 161.

Type citation: "In collibus tam calcarii quam sabulosis secundum rivum⁽¹⁾ Murchison et sinum⁽²⁾ Champion Bay" Western Australia, *Aug. Oldfield 856*, 1859.

Type material: At L is a sheet labelled "Solanum Oldfieldii F. Mueller Murchison River". At MEL are three sheets (1) MEL 12176 with two labels (a) "Solanum Oldfieldii F. Mueller Murchison River Oldfield" and (b) "Solanum Oldfieldii F.M. Murchison R. W.A. Oldf." (2) MEL 12172 with two labels (a) "Solanum Oldfieldii ferdr v Mueller Murchison River" (b) "856 Spreading plant fl. large blue - sand nr. Linton, Pt. Gregory" and (3) MEL 12174 also with two identical labels "Solanum Oldfieldii F.M. var. inerme Murchison R.W.A. Oldf." At K is a sheet labelled "Solanum Oldfieldii F. Muell. Sand, Lynton, Port Gregory W. Aust. Oldfield". I propose this as lectotype because of the quality of the specimen.

Literature

Bentham (1868) 457; Mueller (1868) 145; Mueller (1882) 96; Mueller & Tate (1896) 333; Black (1918) 182; Bennetts (1935) 4; Everist (1974) 474; Grieve & Blackall (1975) 600.

An erect clonal *shrub* to 1 m high; prickles to 8 mm long, unequal, straight, often dark, scattered on stems, sometimes lacking, generally absent from other parts; all parts densely pubescent with stellate hairs, (sessile or shortly multiseriate-stalked, porrect-stellate with medium central cell) often rusty, particularly growing tips and calyces, general aspect



Fig. 60. *Solanum oldfieldii* F. Muell. Drawn from pot grown plant at the Waite Institute, from seed from Symon 5450, collected 88 km north of Geraldton on the roadside in cleared mallee, WA (ADW 43250). $\times \frac{2}{3}$.

rusty green, leaves somewhat discolourous. *Leaves* 2-5 (7) x 1-3.5 (5) cm, ovate to oblong, entire, or with 3-8 shallow rounded lobes, sinuses rounded, margin often undulate, the leaf slightly recurved on midrib, leaf apex rounded, base rounded to cordate, equal or oblique; petiole 0.5-1 (3) cm long, relatively short and thick. *Inflorescence* a short cyme with 3-5 flowers, some solitary pedicellate flowers may occur, peduncle to 1 cm long; floral rhachis to 5 mm long; pedicel 0.5-1 cm long. *Calyx* tube 3-4 mm long; lobes 3-5 mm long, oblong to obovate, acumens 0.5 mm long; pedicel and calyx densely rusty tomentose. *Corolla* 3-4 cm diam., rotate-pentagonal, showy-purple, petal acumens triangular. *Filaments* (Fig. 163) 2-3 mm long; anthers 4-5 mm long, oblong, erect to divergent. *Ovary* with some glandular hairs towards apex; style 6-7 mm long, erect or lateral; stigma capitate, green. Fruiting peduncle, pedicel and calyx not much enlarged; *fruit* (Fig. 152) c. 1 cm diam., globular, finally pale yellow. (Fig. 60.)

Chromosome number: $n = 12$ Randell & Symon (1976); in addition plant grown from Symon 8580 from Yerecoin, counted by Randell (unpublished).

Notes

S. oldfieldii with its dark green or rusty foliage and large flowers can make an attractive shrub. It is intermediate between *S. lasiophyllum* and *S. coactiliferum*. From the first species it differs in its smaller, often lobed leaves, rusty tomentum, and exposed yellow fruits, and from the latter in its nearly rotate corolla, shorter, broader, lobed leaves, larger stature and usually 5-partite flowers.

Distribution and habitat (Map 6)

W.A. in the central and southern arid areas on slopes or plains with gravelly or sandy soils.

Selected specimens (total seen 65)

WESTERN AUSTRALIA: *Drummond* 224, 1844, Swan River (BM, E, CGE, OXF, P); *Symon* 5450, 4.vii.1967, N of Geraldton (ADW, B, CANB, K, NSW, PERTH, US); *George* 2374, 14.v.1961, Murchison River Gorge (ADW, PERTH).

58. *Solanum plicatile* (S. Moore) Symon, stat. nov.

Basionym: *S. oldfieldii* F. Muell. var. *plicatile* S. Moore, J. Bot. 41 (1903) 99.

Type citation: *S. chenopodium* F. Muell. misapplied by S. Moore J. Linn Soc. 34 (1899) 206. This plant was collected by L.C. Webster, "Solanum. Bushy habit, 2 feet high. Near Coolgardie, August".

Holotype: BM and photo ADW.

Literature

Grieve & Blackall (1975) 601 as *S. oldfieldii* var. *plicatile*.

An erect, clonal, small *shrub* to 60 cm high, becoming woody below; stems probably only lasting a few years; prickles to 5 mm long, unequal, scattered on stems, rare or absent on leaves and calyces, straight or slightly recurved, reddish-brown; all parts densely pubescent with pale stellate hairs (sessile to long multiseriate-stalked, porrect-stellate with long central ray) almost floccose on young growth, general aspect grey-green, concolorous. *Leaves* 1.5-2 x 0.5-0.8 cm, oblong, shallowly 9-11-lobed, sinuses rounded, rarely cut halfway to midrib, margin strongly and tightly convoluted or plicate, mid-vein often slightly recurved especially towards apex. *Inflorescence* a 1-3-flowered cyme; peduncles to 5 mm long, or absent, solitary pedicellate flowers occur, pedicel 5-6 mm long. *Calyx* tube 2-3 mm long, lobes c. 3 mm long, elliptic, acumens 1 mm long. *Corolla* 2 cm diam., 4-5-partite, broadly stellate, purple. *Filaments* (Fig. 163) short; anthers 5 mm long, tapered upwards. *Ovary* with few glands towards summit; style 6-7 mm long,

glandular below; stigma capitate. Fruiting peduncle, pedicel and calyx not much enlarged; *fruit* (Fig. 152) 8-10 mm diam., globular, finally yellowish. *Seeds* 2-2.5 mm long, pale, minutely reticulate. (Fig. 61.)

Chromosome number: $n = 12$ Randell & Symon (1976); in addition *Haegi* 923 counted by D. Jewell (unpublished).



Fig. 61. *Solanum plicatile* (S. Moore) Symon. Drawn from herbarium specimen, *Symon* 5475, 37 km south of Menzies on the road to Kalgoorlie, WA (ADW 33039). $\times 2/3$.

Notes

The puckered leaves of the typical form are characteristic of the species but forms do occur linking it with *S. coactiliferum* which is undoubtedly its closest relative.

Distribution and habitat (Map 2)

W.A., in southern arid areas centred on the eastern goldfields. It has been collected from the sandy plains with red soils under *Eucalyptus*, *Acacia* and mixed woodlands and occasionally from *Triodia* hummock grasslands.

Selected specimens (total seen about 35)

WESTERN AUSTRALIA: *Broadbent* 1661, 9.x.1953, Scotia Siding (ADW, BM); *Symon* 5475, 6.vii.1967, S of Menzies (AD, ADW, B, CANB, K, PERTH, US); *Wilson* 7740, 5.ix.1968, E side Fraser Range (ADW, PERTH); *Symon* 9915, 11.v.1975, N of Scotia (ADW, B, L, MO, PERTH).

59. *Solanum coactiliferum* J.M. Black, Trans. & Proc. Roy. Soc. South Australia 33 (1909a) 224.

Type citation: "Port Broughton district; numerous but apparently localised".

Syntypes: AD 96014020, "Pt. Broughton Aug. 1904 G.M. Black" and "nr. Pt. Broughton 1.3.09, G.M. Black". The first is a fragment bearing a fruit and the second is a more or less entire plant with flower and fruit. I propose the latter as *lectotype*. There is an isoelectotype of this at K and NSW.

Literature

Pattingale (1909) 288; Ewart, Rees & Wood (1911) 62; Black (1916) 71; Black (1921) 18; Black (1926) 497; Webb (1952) 94; Cleland & Tindale (1959) 123.

Common name: western nightshade.

An erect, clonal, small *shrub* 15-30 cm tall, stems usually lasting several years; prickles 2-5 mm long, straight or slightly recurved, usually present on stems, rarely on leaves or calyx, plants without prickles occur; all parts pubescent with dense tomentum of stellate hairs (sessile or short multiseriate-stalked, porrect-stellate hairs with short or medium central ray) general aspect grey or silvery, not rusty, leaves concolorous. *Leaves* 1-5 x 0.5-1 cm, oblong, often folded, slightly recurved along midrib (particularly in dried specimens), apex obtuse, base cuneate to truncate; petiole 3-5 (-10) mm long. *Inflorescence* a 2-6-flowered cyme, common peduncle to 10 mm long, usually short, floral rhachis short, solitary pedicellate flowers occur, flowers 4- or 5-partite, sometimes on the same plant; pedicels 1-1.5 cm long. *Calyx* 6-8 mm long. *Corolla* 2-3 cm diam., rotate-stellate, (almost square in 4 partite flowers) sometimes reflexed, interacuminal tissue well developed, not exceeding petal tips; colour RHS Campanula Violet 37/1-37/2. *Filaments* (Fig. 163) short; anthers 5-6 mm long, oblong, tapering, loosely erect to slightly divergent. *Ovary* 1-1.5 mm long; style 8-10 mm long, erect, straight; stigma green or purplish, turned upward. Fruiting pedicel 1-2 cm long, firming and lengthening, strongly deflexed; calyx appressed, slightly enlarged to cover base of fruit, lobes oblong-apiculate; *fruit* (Fig. 152) 0.8-1.5 cm diam., depressed-globular, often solitary or cluster of 2-3, young fruits may be viscid and bear few stellate hairs towards apex, minute glandular hairs may also be abundant, ripe fruit finally yellow to yellowish-brown, firm, scarcely succulent, not bony, often drying on plant. *Seeds* 3 mm long, pale to light brown, minutely wrinkled on surface, flattened, ovate to almost orbicular, slightly notched at hilum, in old and mature fruits seeds may have brittle, glassy, resinous cover. Nine fruits counted contained (27-) 51 (-106) seeds. (Fig. 62.)

Chromosome number: $n = 12$ Randell & Symon (1976); in addition Symon 2916, 3440 and Burford 11 counted by Randell, and Symon 3963, 4704 counted by B.A. Barlow (all unpublished).

Notes

This species is closely related to *S. esuriale* Lindl. and can usually be distinguished by its sub-shrubby habit, sparse, slightly recurved prickles, often 4-partite corolla and oblong, often folded leaves. Several variants can be noted: (1) a form with slightly more robust leaves, densely covered with a looser, longer, paler tomentum than the typical form: this has been collected from an area S.E. of Kingoonya between Lake Everard and Lake Gairdner; (2) a rather narrow-leaved form from south western Qld which may also



Fig. 62. *Solanum coactiliferum* J.M. Black. Drawn from pot grown plant at the Waite Institute, from Symon 3440, collected 70 km south-east of Kingoonya, between Lake Everard and Lake Gairdner, SA (ADW 42423). $\times \frac{2}{3}$.

occur occasionally in N.T., where it could be confused with *S. tumulicola* Symon. In W.A. forms which approach *S. plicatile* also occur. These have broader leaves with shallowly lobed margins. It seems possible that *S. plicatile* and *S. coactiliferum* are examples of the products of speciation of an ancestral taxon that once had a trans-Australian distribution which has been disrupted by climatic change; *S. hystrix* and *S. hoplopetalum* are another such pair based on a common ancestral species.

Distribution and habitat (Map 4)

All mainland States, it is one of the most widespread species. It occurs in the drier regions of southern and central Australia often in sandy loams and sand dunes.

Selected specimens (total seen about 210)

WESTERN AUSTRALIA: *Chippendale* 4525, 20.vi.1958, 61 km S of Giles (ADW, CANB, NT, PERTH); *Briggs* 3573, 9.vi.1970, 40 km SE of Giles Met. Stn (ADW, NSW).

NORTHERN TERRITORY: *Winkworth* 739, 23.xi.1954, SW of Alice Springs (AD, ADW, CANB, NT); *Chippendale* 696, 26.xi.1954, W of Curtin Springs (ADW, CANB, NSW, NT); *Perry* 5391, 4.ix.1955, E of Hermansburg (AD, BRI, CANB, K, NSW, NT, PERTH); *Orchard* 750, 11.vii.1968, N of Andado (AD, C, H, NT).

QUEENSLAND: *Allen s.n.*, 26.x.1941, Gilruth Plains (NE); *McKee* 10366, 10.iv.1963, Gilruth Plains (NSW).

NEW SOUTH WALES: *Constable* 4652, 27.x.1963, W of Cobar (ADW, NSW); *Briggs* 2788, 26.v.1969, E of Lethero (ADW, NSW, PERTH).

VICTORIA: *Symon* 9875, 6.ii.1975, near Annuella (ADW, F, MO).

SOUTH AUSTRALIA: *Forde* 524, 9.ix.1956, S of Emu (AD, CANB, K); *Eichler* 13830, 22.iv.1957, near Renmark (AD, ADW, E); *Whibley* 306, 6.x.1958, SW of Buckleboo (AD, B, BM, K, M); *Michelmores s.n.*, 22.iv.1965, Minnipa (ADW, BIRM, CANB, DAV, K).

60. *Solanum centrale* J.M. Black, Trans. & Proc. Roy. Soc. South Australia 58 (1934) 180.

Type citation: "Central Australia, Macdonald Downs Station, 1932, Miss J. Chalmers".

Type material: On AD 96014019 are extensive notes and drawings by Black based on the Chalmers specimen as well as a leafy flowering twig and detached berry, seeds and leaves, some of which may belong to a T. Strehlow, 1934, collection on the sheet. The berry appears to be the basis of Black's drawing but not the leaves. Amongst the notes is the statement that the specimen from which the drawing was made was sent to Kew 21/1/35. The specimen at K is obviously the one on which the drawing is based and in view of the ambiguities of the sheet at AD I propose the sheet at K as *lectotype*. Fragments at AD may be *isoelectotypes*.

Literature

Black (1938) 106; Cleland & Johnson (1939a) 172, as *S. nemophilum*; Sweeney (1947) 289; Cleland & Tindale (1959) 123; Peterson (1979).

A clonal, herbaceous *perennial* or small undershrub, 15-45 cm high, often sprawling; prickles 1-5 mm long, often absent, occurring towards base in some plants, usually sparse, never on leaves or calyces; all parts pubescent with a short, dense, often rusty tomentum of stellate hairs, (short or long multiseriate-stalked, porrect-stellate hairs with medium central ray), leaves concolorous, general aspect pale or rusty yellowish-green. *Leaves* (1.5-) 4 (-6) x (1-) 1.5 (-2) cm, ovate-oblong, apex rounded, base rounded or truncate, usually equal; petiole (5-) 7 (-15) mm long. *Inflorescence* a 1-6-flowered cyme, from extra-axillary position; peduncle to 10 mm long, or absent; floral rhachis 0.5-1.5 (-4) cm long, usually short, solitary flowers also occur; pedicel c. 1 cm long. *Calyx* tube 2-3 mm long, acumens 1-2 mm long. *Corolla* broadly stellate, pale or deep purple, often reflexed. *Filaments* (Fig. 163) short; anthers about 5 mm long, attenuate-oblong. *Style* c. 8 mm

long, erect, exceeding divergent-erect anthers; stigma bent. *Fruit* (Fig. 152) 1-1.5 cm diam., globular, at first drab green, then yellowish and finally drying brown to a raisin like appearance, cymes with 1-4 fruit. *Seeds* (2) 3 (4) mm long, variable in number, firm, pale or light brown surface minutely undulate under lens. (Fig. 63.)

Chromosome number: $n = 24$ Randell & Symon (1976).



Fig. 63. *Solanum centrale* J.M. Black. Drawn from pot grown plant at the Waite Institute, from R. Seemark, collected at Musgrave Park Stn, northern SA (ADW 42126, fruit from ADW 31456 and 34753). $\times 2/3$.

Notes

This species is one of the most popular and important of those eaten by the Aborigines. The fruits may be eaten when ripe and beginning to shrivel, or may be pounded into a pulp, moulded into a large ball and dried for later use. For an account of Aboriginal use of *Solanum* species see Petersen (1979). The species was misidentified in early records and for a time was called *S. nemophilum* F. Muell.

Distribution and habitat (Map 7)

W.A., N.T., and S.A.; widespread in the sandy deserts of arid central Australia.

Selected specimens (total seen about 125)

WESTERN AUSTRALIA: *George* 8707, 13.vi.1967, 134 miles NE of Cosmo Newberry (ADW, PERTH); *Howard* s.n., 6.vi.1968, Mt Samuel (ADW, B, CANB, K, PERTH); *Symon* 10001, 13 km S of Kumarina (ADW, B, CANB, PERTH).

NORTHERN TERRITORY: *F. Mueller* s.n., s.d., Sturts Creek (K); *Perry* 3407, 12.iii.1953, 13 km NE MacDonald Downs Stn (BRI, CANB, K, NSW); *Chippendale* 2017, 13.iv.1956, No. 2 Desert Bore Hamilton Downs (ADW, BRI, CANB, NSW, NT); *Symon* 6931, 18.v.1971, 47 km SW of Hookers Creek (ADW, B, CANB, L, NT).

SOUTH AUSTRALIA: *Helms* s.n. 1891, Upper Arkaringa Valley (NSW); *Cleland* s.n., Sept. 1945, Ernabella (AD); *Weber* 840, 1.vii.1968, Stuart Highway 30 km S of S.A.-N.T. border (AD, B, L, VC).

61. *Solanum hesperium* Symon, sp. nov.

Suffrutex tenuis 30-40 cm altus, inermis aut perpaucis aculeis 2-3 mm in caule. Omnes partes densis stellatis pilis pubescentes; adpectu generali ferrugineo-virenti. *Folia* (4-) 2 x 0.75 (-1.5) cm, oblonga, apice rotundato, basi rotundato aut sub-cuneato, saepe obliquo; petiolus 2-5 mm longus. *Inflorescentia* 1-5 floribus cymosa; interdum flos singularis; pedunculus 0-1 (-2) cm; pedicellus 4-8 mm, tubus calycis 2 mm, lobi calycis circa 3 mm obtuse triangulares; *corolla* 2-2.5 cm diametro late stellata, filamenta c. 1 mm; antherae 4-5 mm longae, lanceolatae; ovarium glabrum aut raro paucis stellatis pilis in apice; stylus 6-8 mm erectus; stigma capitatum. *Bacca* 0.8-1 cm diametro, depressa, globularis, flava demum testacea; pedicellus deflexus. Semina 1.75-2 mm longa pallida, minute reticulata.

Holotype: *J. W. Green* 1430, 21.vii.1957, 30 km (19 miles) SE of Denham, W. Aust. "Slender shrub 30-40 cm high, flowers blue". PERTH (Fig. 64.)

A slender shrub 30-40 (-100) cm high, unarmed or with few scattered, slender, straight prickles, 2-3 mm long on stem only; all parts pubescent with close dense tomentum of stellate hairs (sessile or stalked porrect-stellate with short or long central ray) rusty coloured on new growth and stems, general aspect drab rusty-green, slightly discoloured. *Leaves* (4-) 2 x 0.75 (-1.5) cm, oblong, apex rounded, base rounded or rounded-cuneate, often oblique, generally folded along midvein in dried specimens, petiole 2-5 mm long. *Inflorescence* a 1-5-flowered cyme from extra-axillary position, solitary flowers may occur; peduncle to 1 (-2) cm long; floral rhachis to 1 cm long; pedicel 4-8 mm long. *Calyx* tube c. 2 mm long; lobes c. 3 mm long, bluntly triangular. *Corolla* 2-2.5 cm diam., broadly stellate, acumens slightly exceeding inter-acuminal membranes. *Filaments* c. 1 mm long; anthers 4-5 mm long, lanceolate. *Ovary* glabrous or rarely with few stellate hairs at apex; style 6-8 mm long, erect, stigma capitate. *Berry* 0.8-1 cm diam., depressed globular, finally yellowish or drying brown, pedicel deflexed, to 1.5 cm long, calyx lobes to 7 mm long, covering base of fruit only, cymes bearing 1-2 berries only. *Seeds* 1.75-2 mm long, pale, minutely reticulate. (Fig. 66.)

Chromosome number: unknown.

Distribution and habitat (Map 11)

W.A., Gascoyne district between Geraldton and Carnarvon. Only one collection has any habitat details and the plant is reported to grow "in sand".



Fig. 65. Holotype of *Solanum terreum* Symon (Symon 9932, ADW).

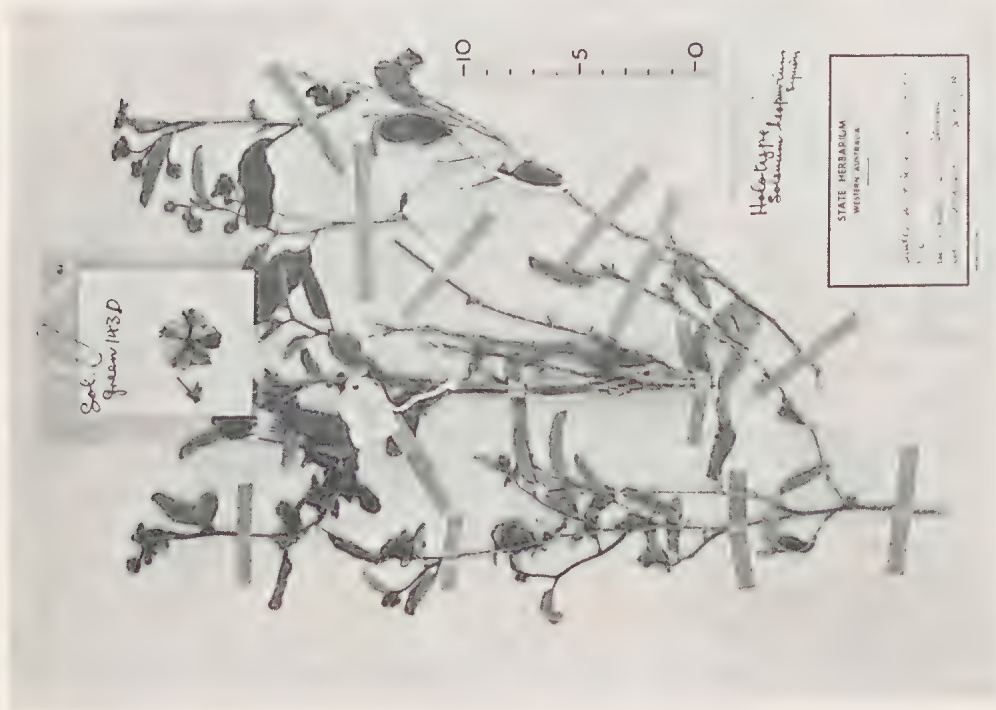


Fig. 64. Holotype of *Solanum hesperium* Symon (Green 1430, PERTH).

Notes

This species is closely related to both *S. centrale* and *S. coactiliferum* and to a lesser extent to *S. esuriale* and *S. oldfieldii*. From the first it differs in its slender shrubby habit, smaller leaves, close more dense pubescence and different berry; from the second in its more slender habit, fewer (straight) prickles, and generally smaller leaves; from the third in its shrubby habit and narrower leaves and from the fourth in its smaller, entire leaves and smaller, broadly stellate corolla. The specific name is derived from the extreme western distribution of the species.



Fig. 66. *Solanum hesperium* Symon. Drawn from herbarium specimen, *Beaglehole 11831*, collected at Nerrin Nerrin, WA (ADW 32677). Fruit from *Lullfitz 1959*, from the North-western Coastal Highway, WA (PERTH). $\times \frac{2}{3}$.

Selected specimens (total seen 15)

WESTERN AUSTRALIA: *Blackall* 4774, 19.ix.1940, between Yuna and Dartmoor (PERTH); *Green* 1430, 21.vii.1957, 31 km SE of Denham (PERTH); *George* 3239, 18.ii.1962, 51.5 km N of Murchison River on NW Coastal Highway (PERTH); *Lullfitz* 1959, 19.xii.1962, 640 km peg NW Coastal Highway (PERTH); *Ashby* 1589, 14.viii.1965, between Yuna and Mullewa Road (AD); *Beauglehole* 11831, 21.viii.1965, Nerrin Nerrin 285 km SSE of Carnarvon (acb, ADW); *Shaw* 583, 1.x.1966, between Walkaway and Eradu at Ellendale Bluffs (AD); *Ashby* 2234, 21.viii.1967, near 670 km peg on N-central coastal highway (AD); *Phillips* 1150, 17.ix.1968, 32 km S of Wannoo (ADW, CBG).

62. *Solanum esuriale* Lindl. in Mitchell, Three Exped. 2 (1838) 43.

Type citation: "April 19, 1836, We overtook the party where it had crossed some extensive plains (almost opposite the entry of Willandra Billabong into the Lachlan and somewhat east of Hillston) where we observed a species of *Solanum* the berries of which our native guides gathered and ate". J. Richardson was the collector of plants.

Holotype: CGE. The sheet of CGE consists of two complete plants one of which bears the label:- Interior of New Holland, *S. esuriale* m. Apples eaten by the natives of the Lachlan. Major Mitchell's Expedition 1836, 24 March (25). The isotype at Kew is simply labelled: Interior of New Holland, *Solanum esuriale* Lindl., Major Mitchell's Expedition 1838.

Solanum pulchellum F. Muell., Trans. Philos. Soc. Victoria 1 (1855) 18-19.

Type citation: "Along the (1) Wimmera (2) Avoca and (3) Murray Rivers: thence through the desert country as far as (4) Lake Torrens, (5) Spencers and (6) St. Vincent Gulfs".

Syntypes: (1) K; (3) CGE, TCD, E; (Nos 2, 4, 5, 6 not traced).

Solanum ellipticum forma *inermis* Wawra, Itinera principum S. coburgi 1 (1883) 100.

Type citation: "Inundationsgebiet des Murray, in sehr hartem schwarzgrauen Thonboden. Coll. 1 485".

Type material: Possibly W. Not seen. Locality and description suggest a plant of *S. esuriale* Lindl.

S. esuriale Lindl. var. *sublobatum* Domin, Bibl. Bot. 89 (1929) 1137.

Type citation: Queensland: Grasflächen der Rolling Downs bei Longreach, *Domin s.n.*, iii.1910.

Holotype: PR 530896, photo ADW.

This is a young plant just flowering and has the somewhat larger, slightly lobed leaves of this phase of growth. I do not consider it warrants taxonomic status.

S. esuriale Lindl. forma *xanthocarpum* Domin; Bibl. Bot. 89 (1929) 1137, nomen nudum.

S. esuriale Lindl. forma *rubro-aurantiacum* Domin, loc. cit., nomen nudum.

These last two forms are mentioned by Domin but no formal description nor types are given.

S. esuriale Lindl. var. *ovalifolium* Reader, at G is a specimen 19.ii.1906, Wimerera, City of Boroung but no publication of this name has been traced by me.

Literature

Dunal in DC. (1852) 373; Bentham (1868) 454; Mueller (1868) 145 as *biflorum*; Mueller (1882) 96; Bailey (1883) 345; Palmer (1884) 104; Bailey & Gordon (1887) 51; Mueller (1888) 362; Maiden (1889a) 543; Tate (1890) 145; Turner (1891) 124; Mueller & Tate (1896) 373; Moore (1893) 333; Tepper (1893) 20; Lower (1897) 273; Koch (1898) 114; Maiden (1898c) 37; Maiden (1899) 625; Bailey (1901) 1085; Spillane (1905) 617; Turner (1905) 36; Bailey (1906) 121; Dixon (1906) 221; Haviland (1911) 529; Cambage (1912) 646; Bailey (1913) 354; Maiden & Betche (1916) 181; Ewart & Davies (1917) 243; Henry (1922) 341-346; Collins (1923) 247 and (1924) 9; Maiden (1926) 497; Domin (1929) 1136; Ewart (1931) 1005; Anon (1937) 112; White (1937a) 616; White (1938) 198; Hurst (1942) 369; Webb (1948) 158; Webb (1949) 50; Irvine (1957) 128; Chippendale (1960) 38; Young (1960) 94; Leigh & Mulham (1965) 105; Willis (1972) 552; Everist (1974) 469; Grieve & Blackall (1975) 600; McMeniman (1976) 432; O'Sullivan (1976) 414.

Common name: quena

A clonal perennial *herb* 15-30 cm tall with several branches at or near ground level, the branches themselves sparsely branched; prickles usually absent, some plants have a few prickles towards base of plant, all parts covered with close, dense, pale tomentum of stellate hairs (sessile or shortly multiseriate-stalked, porrect-stellate with short or medium

central ray), general aspect grey-green. Lower leaves 5-8 cm long, oblong, obtuse, undulate, with 5-9 short lobes, sinuses shallow and rounded; later adult leaves 3-7 x 0.5-1 cm, oblong, entire or scarcely lobed, tip obtuse or acute, veins prominent below, in dried specimens folded leaves are straight rather than recurved (cf. *S. coactiliferum*). Inflorescence a 2-6-flowered cyme; peduncle 1-4 cm long; floral rhachis usually less; pedicels slender, 1-1.5 cm long. Calyx tube 2-3 mm long, ribbed by main veins which continue into the linear lobes of 2-3 mm long. Corolla 1-1.5 cm long, rotate-stellate, interacuminal tissue well developed, not exceeding petal tip. Filaments (Fig. 163) 2-3 mm



Fig. 67. *Solanum esuriale* Lindl. Drawn from field grown plant at the Waite Institute, from seed from Symon 3951, collected 10 km north of Hawker, SA (ADW 39724). $\times \frac{2}{3}$.

long; anthers 4-5 mm long, oblong, slightly tapered, loosely erect. *Ovary* 1-1.5 mm long, globular; style 8-10 mm long, pale, erect; stigma also pale, slightly bent at tip. Fruiting peduncles and pedicels firming, pedicels deflexed; calyx slightly enlarged to cover base of fruit, appressed, lobes broad, tip linear; *berry* (Fig. 152) 1-1.5 cm diam., globular or sometimes obovoid with distinctly acute tip, at first marbled green, finally pale yellow to light yellow-brown, firm, not succulent nor bony, 1-several fruits ripening per peduncle. *Seeds* 2-3 mm long, flattened, irregularly obovate, pale yellow-brown. (Fig. 67.)

Chromosome number: $n = 12$ and $n = 24$ Randell & Symon (1976). In addition $n = 24$ has been counted by Randell for *Symon* 2146 and 3977.

Notes

S. esuriale is a variable species. Prickly and unarmed plants occur; in Vic. slender plants with smaller rounded leaves known as *S. pulchellum* are found and in Qld coarser plants with lower leaves shallowly lobed (var. *sublobatum* of Domin) occur. However, vigorous plants often show some lobing on their lower leaves (which are usually absent in herbarium specimens), and these do not warrant taxonomic status. Berries are usually globular or ovoid, but some may have an acute apex, and these occur amongst globular forms and show no particular patterns of distribution. Flowers are usually five-partite, but four-partite flowers may be found. The fruits were eaten by the Aborigines and are also a measurable component in the diet of Emus. *S. esuriale* is closely related to *S. tumulicola* from which it differs by its broader leaves and ecology. It is also related to *S. coactiliferum* from which it differs by its herbaceous habit, closer more dense tomentum, peduncle length, five-partite rather than four-partite flowers, and globular rather than depressed-globular fruits. *S. esuriale* differs from *S. terraneum* which has larger, broader, oval leaves, a more deeply stellate corolla and linear acumens on the calyx lobes.

Distribution and habitat (Map 8)

S. esuriale is widespread in eastern Australia from Qld to northern Vic. with outlying populations in all other States except Tas. These peripheral populations may well be remnants of a once wider distribution. The species occurs in many different habitats and is often found bordering seasonal pools or creeklines or on levee banks of streams; in W.A. it occurs on subcoastal sandy soils.

Selected specimens (total seen about 300)

WESTERN AUSTRALIA: *Hill* 518, 17.ix.1952, Montebello Island (BM); *Symon* 5354, 27.vi.1967, near Nita Downs Stn turn-off, 80 Mile Beach (ADW, B, CANB, K, PERTH, US).

NORTHERN TERRITORY: *Nelson* 325, 19.vi.1962, 6 km W of Argadargada Homestead (ADW, NT); *Beaglehole* 27948, 29.vii.1968, Old Andado Homestead, Simpson Desert (acb, ADW, CANB).

QUEENSLAND: *Clemens* s.n., April 1946, Yalleroi (AD, BM, BRI, K); *Gordon* 560, 1970, Myall Park, Glen Morgan (ADW, B, CANB, K, L); *Symon* 5736, 20.viii.1968, Nappamerrie Stn (ADW, BRI).

NEW SOUTH WALES: *Morris* s.n., 1920, Broken Hill (ADW, BRI, NSW); *Goode* 83, 8.xi.1954, Piallaway Dist. (BM, K, NSW); *Symon* 6743, 21.vi.1969, Kars Stn (ADW, B, CANB, K, NSW, US).

VICTORIA: *Beaglehole* 7129, 11.iii.1951, Nichols Point, NW Victoria (acb, ADW, MEL); *Symon* 9792, 28.i.1975, Hopetoun (ADW, F, MO).

SOUTH AUSTRALIA: *Howard* s.n. 15.i.1966, Renmark (ADW, CANB, DAV, K, SOM); *Symon* 3951, 6.iii.1966, 10 km S of Hawker (ADW, HUJ, NA, NSW, SOM and cultivated specimens to AAU, ADW, B, BIRM, L); *Symon* 5997, 23.vii.1968, 16 km E of Paralana Hot Springs (ADW, CANB, K, NSW).

63. *Solanum tumulicola* Symon, Trans. & Proc. Roy. Soc. S. Aust. 95 (1971) 234.

Type citation: D.E. Symon 5085, 7.vi.1967, about 40 km east of the Stuart Highway at Daly Waters, Northern Territory. "In a seasonally dry swamp with many mounds about tree stumps and ant hills. The *Solanum* was common on the mounds, and

always above the lower levels, clonal, straggly, flowers blue, few fruits seen (too early), the plants were in active growth".

Holotype: ADW. *Isotypes*: AD, B, CANB, K, NSW, NT, US.

A sprawling, clonal, perennial *herb* to 30 cm tall, without prickles, all parts pubescent with dense, close, tomentum of minute, stellate hairs, (sessile porrect-stellate with short central ray) general aspect grey-green, leaves slightly discoloured. *Leaves* (2.5-) 4 (-8) x 0.4-0.8 cm, linear-lanceolate, margin entire, apex acute, base cuneate, leaves of dried



Fig. 68. *Solanum tumulicola* Symon. Drawn from herbarium specimen, Symon 5085, collected 40 km east of the Stuart Highway at Daly Waters, NT (ADW 33286). $\times \frac{2}{3}$.

specimens often folded along mid-vein; petiole 0.5-1 cm long. *Inflorescence* a cyme from an extra-axillary position, with 1-6 flowers; peduncle 1-1.5 cm long; pedicel 1 cm long, slender. *Calyx* 2-3 mm long; lobes 1-1.5 mm long, bluntly triangular, lobe-tips short. *Corolla* 2 cm diam., stellate. *Filaments* (Fig. 163) c. 1 mm long; anthers 4 mm long, oblong, tapered upwards. *Ovary* with few stellate hairs at summit; style c. 6 mm long, erect, stigma capitate. Fruiting peduncle 2-3 cm long; pedicel c. 1.5 cm long, deflexed; calyx enlarged to cover base of fruit, *berry* (Fig. 152) 1-1.5 cm diam., yellowish when ripe. (Fig. 68.)

Chromosome number: $n = 12$ Randell & Symon (1976) and, in addition, $n = 12$ from Symon 10356 collected south of Dunmara, N.T.

Notes

This slender-leaved species is a northern equivalent of the much more widely spread *S. esuriale*. With this last species it shares the same general habit, often apiculate fruit, and preference for heavy soils in low lying seasonally flooded areas. It differs from *S. esuriale* in its narrow leaves and, often, more tufted habit.

Distribution and habitat (Map 2)

Occurring in N.T. and, rarely, Qld; it has almost invariably been collected from heavy dark soils in depressed or swampy sites which are flooded in the wet season; only rarely has it been found on hard gravelly loams or sandy soils.

Selected collections (total seen 20)

NORTHERN TERRITORY: *Perry* 1885, 9.viii.1948, 48 km E of Eva Downs (AD, BRI, CANB, K, NSW); *Chippendale* 5678, 12.iv.1959, 83 km NE of Tanami (ADW, BRI, NT); *Latz* 91, 10.i.1968, Dunmara Roadhouse (ADW, BRI, NT).

QUEENSLAND: *Ford* 21, 24.ix.1949, Tiree Stn (NSW); *Johnson* 86, 1.v.1968, Lake Galilee (K).

64. *Solanum tetrahecum* F. Muell., *Fragm.* 2 (1861) 165.

Type citation: "In (1) silvis Araucariarum ad flumina Brisbane, (2) Pine River et (3) Burnett River F. Mueller; (4) ad oppidulum Warwick, Beckler; (5) ad pagum Tenterfield, Novae Angliae, Stuart".

Lectotype: There is at MEL a sheet, MEL 12231, bearing two labels "Solan. cor. viol. BB Country" (BB = Bunya Bunya = Araucaria) and "*Solanum tetrahecum* Ferd Mueller S. corifolio simile. Eutassa ranges Upper Brisbane Dr. M". I propose this as lectotype. Syntypes of (3) are at K and TCD, the rest have not been traced.

Literature

Mueller (1861) 165; Bentham (1868) 453; Mueller (1882) 96; Bailey (1883) 344; Moore (1893) 333; Bailey (1901) 1084; Dixon (1906) 222; Bailey (1913) 354; Maiden & Betche (1916) 181; Webb (1952) 94.

An erect, sparingly clonal *subshrub*, 30-60 cm tall, becoming woody at base, prickles present or absent, usually present on young or vigorous growths, to 1 cm long, straight, firm, often reddish or brownish, scattered on stems, less common on upper and lower leaf surface, generally absent from inflorescence; all parts with tomentum of stellate hairs (sessile or multiseriate-stalked, porrect-stellate with short or long central ray), pale or rusty, sparse on upper leaf surface, dense below, general aspect dark green, discolorous. *Leaves* (4-) 5 (-7) x (0.5) 1 (-1.5) cm long, oblong, entire or with slightly undulate margin, apex rounded or acute, base rounded to subcordate, oblique; petiole 0.5-1.5 cm long. *Inflorescence* a 1-5-flowered cyme from an extra axillary position; peduncle to 1 cm long; floral rhachis to 1.5 cm long; pedicel 5-10 mm long. *Calyx* c. 3 mm long; lobes 1-2 mm long, triangular, acumens 1-2 mm long. *Corolla* 2-4 cm diam., stellate, lobes relatively broad, often reflexed, blue-purple, showy. *Filaments* (Fig. 163) 1 mm long; anthers 6 mm long, tapering upwards, widely divergent. *Ovary* with few glandular hairs at summit;

style c. 1 cm long, curved, few glandular hairs at base; stigma capitate. Fruiting calyx enlarged to cover base of fruit, *berry* (Fig. 152) 1.5 cm diam., globular or depressed-globular, at first marbled light and dark green, later pale yellow, readily shed with pedicel when ripe. *Seeds* 2.5-3 mm long, light grey, margin slightly thickened, distinctly minutely reticulate. *Cotyledons* to 14 x 4 mm, lanceolate, sparsely glandular-ciliate. First leaf 12 x 8 mm ovate-elliptic, dark green, almost glabrous above, with glandular and stellate hairs below. (Fig. 69.)



Fig. 69. *Solanum tetrahecum* F. Muell. Drawn from field grown plant at the Waite Institute, from seed from Redgen 039, collected 16 km north of Chinchilla, Qld (ADW 41014). $\times 2/3$.

Chromosome number: $n = 24$ Randell & Symon (1976) and, in addition, $n = 24$ in plants grown from Webb & Tracey 8301 from L'estrange-Meandarra area.

Notes

Some of the northerly specimens are less prickly and more pubescent and in this respect approach *S. nemophilum*. However, the fruit of *S. tetrahecum* is never red. It is perhaps most closely related to *S. elachophyllum* which has much smaller orbicular leaves, an intricate habit and many more prickles.

Distribution and habitat (Map 4)

South-eastern Qld and northern N.S.W. on the headwaters of streams flowing to the Darling River. It has been collected from open savannah, cleared brigalow, hard red earth, red loam, heavy grey clay and rarely in sandy loam.

Selected collections (total seen 50)

QUEENSLAND: *White 10801*, April 1936, Callide Valley (BRI, K); *Smith 3108*, 17.iv.1947, Kingaroy (BRI, CANB, K); *Gordon 571*, 1970, Glen Morgan (ADW, B, CANB, K, L); *Moriarty 1553*, 17.ix.1974, 10 km from Miles (ADW, BRI, CANB).

NEW SOUTH WALES: *Boorman s.n.*, Oct. 1914, Warialda (ADW, NSW); *Gibbon s.n.*, April 1961, Narrabri (NSW).

65. *Solanum elachophyllum* F. Muell., Fragm. 2 (1861) 164.

Type citation: "In virgultis prope flumina Mackenzie et Dawson".

Type material: The specimen MEL 12234 bears the label "*Solanum elachophyllum* Ferd Mueller. Between the Mackenzie and Dawson Rivers. *S. furfuraceo* affine Dr. M". It would have been collected by F. Mueller in Queensland in Nov. 1856. The much better specimen at Kew is here proposed as lectotype.

Literature

Mueller (1861) 164; Bentham (1968) 453; Mueller (1882) 96; Bailey (1883) 344; Bailey (1901) 1085; Bailey (1913) 354.

A rigid, spreading, intricate *shrub* to 50 cm high; prickles 0.5-1.5 cm long, firm, straight, reddish or brown, scattered on stem, occasionally 1-2 on upper leaf surface, often paired adjacent to petiole and appearing like prickly pseudo-stipules. *Leaves* at first pubescent above with minute stellate hairs, (sessile porrect-stellate with short central ray), later green and glabrescent, closely, densely silvery-pubescent below, (sessile porrect-stellate hair with short or medium central ray), general aspect grey-green, distinctly discolorous, 0.7-1.2 cm long, ovate-elliptic, apex rounded or slightly emarginate, base rounded, petiole 2-4 mm long. *Inflorescence* a solitary flower or sometimes two in an extra-axillary position; peduncle absent or very short; pedicel c. 8 mm long, slender. *Calyx* tube 2 mm long, lobes bluntly triangular, mid-vein prominent, acumens 0.5-1 mm long. *Corolla* 1.5-3 cm diam., deeply stellate, lobes often twisted, mauve. *Filaments* (Fig. 163) 1 mm long; anthers 3.5-5 mm long, loosely erect, attenuate. *Ovary* glabrous or with few glandular hairs; style erect, later lateral, slightly hooked, pale. *Berry* (Fig. 152) 1-1.5 cm diam., globular, at first green with paler stripes, finally yellow. *Seeds* 3.5-4 mm long, light grey-brown, minutely reticulate towards margins, 27 and 38 seeds in two fruits. (Fig. 70.)

Chromosome number: $n = 12$ Randell & Symon (1976).

Notes

The few collections seen do not indicate much variability. Its relationships with other species are not clear. In its intricate habit and small leaves it is superficially similar to *S. nummularium* which occurs in the Goldfields region of W.A. However, it differs from

that species in its tomentum, markedly discolorous leaves, different prickles and corolla. It may be more closely related to *S. tetrahecum* which has a similar corolla and fruit, but larger leaves and fewer prickles. The leaves of this species are amongst the smallest of the Australian solanums.

Distribution and habitat (Map 4)

Southern Qld in areas once dominated by brigalow *Acacia harpophylla*. The only ecological notes available state that it occurs on heavy grey clays.

Selected specimens (total seen about 6)

QUEENSLAND: *Story & Yapp* 174, 15.vii.1962, near Warwick (ADW, BRI, CANB); *Johnson* 2874, 21.ix.1969, Thomby, 32 km NW of Theodore (ADW, BRI, MEL).



Fig. 70. *Solanum elachophyllum* F. Muell. Drawn from herbarium specimen, *Johnson* 2874, collected at Thomby, 32 km north-west of Theodore, Qld (ADW 37995). $\times 2/3$.

66. *Solanum papaverifolium* Symon, Trans. & Proc. Roy. Soc. S. Aust. 95 (1971) 233-234.

Type citation: V.N. Gidley s.n., 11.vi.1969, on the property of Dr. Thomas, "Maneroo", Graman, about 56 km north-west of Inverell, New South Wales.

Holotype: NSW. *Isotypes:* ADW, BRI, CANB, K, MEL.



Fig. 71. *Solanum papaverifolium* Symon. Drawn from herbarium specimen, Gidley s.n., from Graman, NSW (duplicate of ADW 38147 at CANB; fruit from ADW 36032, from same site). $\times \frac{2}{3}$.

An erect or sprawling, clonal, perennial *herb* to 30 cm tall, scarcely woody at base; stems probably lasting one season only, general aspect green, leaves concolorous; plant glabrous between prickles except for minute glandular hairs on young growths, stellate hairs absent; prickles to 5 mm long, fine, straight, pale, present on stems, upper and lower leaf surface, pedicel and calyx. *Leaves* c. 5 x 4 cm, ovate, in outline, deeply dissected into 5-11 lobes, each 1-2 x 0.5 cm, sinuses deeply cut almost to mid-vein, lobes themselves with 1-5 lobes or teeth, leaf and lobe apex acute, base cuneate, oblique; petiole 1-1.5 cm long. *Inflorescence* a cyme from the upper parts of stem, with 1-6 flowers; peduncle c. 1 cm long; floral rhachis 1-2 cm long; pedicel c. 1 cm long, slender. *Calyx* tube 2-3 mm long; lobes 3-5 mm long, lanceolate, acumens small. *Corolla* 2 cm diam., stellate. *Filaments* (Fig. 163) c. 1 mm long; anthers 3.5-4 mm long, oblong. *Ovary* with few glandular hairs; style 5-6 mm long; stigma slightly bilobed. Fruiting pedicels 1-2 cm long, recurved; calyx enlarged to cover base of fruit, lobes enclosing and exceeding it; *berry* (Fig. 152) 12-18 x 10-12 mm, depressed-globular, greenish-yellow, with faint stripes of deeper green. (Fig. 71.)

Chromosome number: unknown.

Notes

Little variation has been noticed in this species apart from the larger, more coarsely lobed leaves of the juvenile stages. Its relationship to other Australian species is not clear, but it may be related to *S. adenophorum* and *S. lacunarium*; from both it differs in its absence of glandular and stellate hairs, from the former in its more finely divided leaves, from the latter in prickle and leaf characters.

Distribution and habitat (Map 12)

Qld, in the south, and N.S.W. in the north. It is generally reported from heavy clay soils.

Selected specimens (total seen about 35)

QUEENSLAND: *Everist s.n.*, Nov. 1951, Yandilla (BRI); *Mohen s.n.*, 23.xii.1970, near Dalby (BRI).

NEW SOUTH WALES: *Moore s.n.*, Liverpool Plain (BM, K, NSW); *Gidley s.n.*, 8.iv.1969, "Maneroo", Graman (ADW, BRI, CANB, K, MEL, NSW).

67. *Solanum adenophorum* F. Muell., *Fragm.* 2 (1861) 162.

Type citation: "In collibus sterilioribus inter flumina Dawson et Mackenzie" (Queensland, collected F. Mueller Nov. 17-20, 1856, Gregory Expedition).

Holotype: The specimen at MEL bears the label "*Solanum adenophorum* Ferd Mueller Dawson". It was collected by Mueller between the 17-20 Nov. 1856 on the Gregory Expedition. There are isotypes at K and TCD.

Literature

Mueller (1861) 162; Bentham (1868) 460; Mueller (1882) 96; Bailey (1883) 347; Moore (1893) 334; Bailey (1901) 1090; Dixon (1906) 223; Bailey (1913) 357; Maiden & Betche (1916) 181; Domin (1929) 1140.

An herbaceous, clonal *perennial* to 40 cm high; stems mostly annual, scarcely woody at base; prickles 1-7 mm long, straight, reddish, present on stems, petioles, leaf surfaces, peduncles and calyx; all parts covered with moderately dense tomentum of stellate hairs (sessile or shortly multiseriate-stalked, porrect-stellate with long central ray); also numerous, minute, short glandular hairs; general aspect green. *Leaves* concolorous, 4-6 x 3-4 cm, ovate, with 7-9 main lobes, sinuses shallow rounded and cut to about one third or less of way to midrib, lobes themselves with smaller lobes or an undulate margin, apices rounded or acute, leaf base truncate to cordate; petiole 4-6 cm long, relatively slender. *Inflorescence* a 2-6-flowered cyme from an extra-axillary position; peduncle c. 1 cm long; pedicel 2 cm long, slender. *Calyx* tube 2-3 mm long; lobes 5 mm long, lanceolate. *Corolla* broadly stellate, 2-4 cm diam.;

lobes broad and rounded, purple. *Filaments* (Fig. 163) short; anthers 4-5 mm long, oblong, relatively stout. *Ovary* glandular-pubescent above; style 1 cm long, erect, purple; stigma capitate. *Berry* (Fig. 152) not seen fresh but reported (Mueller 1861) globular, c. 1 cm diam., whitish (?yellowish). (Fig. 72.)

Chromosome number: unknown.



Fig. 72. *Solanum adenophorum* F. Muell. Drawn from herbarium specimen, ADW 31489, collected by B. Whitehead on the Lachlan, 6 km south of Forbes, NSW. $\times 2/3$.

Notes

This relatively rare species is sparsely distributed and is still inadequately known. The collections are widely scattered in time and place and well developed mature fruits are still wanted.

Distribution and habitat (Map 3)

Southern Qld and the Riverina of N.S.W. with a single recent collection from Vic. The only ecological note is one by *Buddee s.n.* 1966 reporting the plant on deep red loam.

Selected specimens (total seen about 10)

QUEENSLAND: *Mueller s.n.*, 17-20.xi.1856, between the Dawson and McKenzie Rivers, rare (K); *Saclier* 3, 28.x.1957, Logan Downs, 110 km N of Claremont (BRI).

NEW SOUTH WALES: *Whitehead s.n.*, 20.ii.1966, Lachlan River 6 km S of Forbes (ADW, CANB, NSW); *Chauncey s.n.*, 20.i.1941, Ganmain (ADW, NSW).

VICTORIA: *McIlroy* 3102, March 1959, near Barrakee Railway Stn (MEL).

68. *Solanum eremophilum* F. Muell., *Linnaea* 25 (1852) 432.

Type citation: "In pascuis argillaceis parum salsis ad latus occidentale montium Flinders-range et inter rivos Rocky-river et Rocky-creek". (South Australia).

Lectotype: At MEL there are two sheets, one bears two labels "*Solanum eremophilum* Ferd Mueller. Loamy dry places" and "*Solanum eremophilum* Ferd Mueller N. Holl. austr. interioris Ferd Mueller". The second sheet has a label including "*Solanum eremophilum* Ferd Mueller" then a brief description in Latin and two lines in German concluding "Flinders Ranges, Oct. '51". The material appears to be consistent with a single gathering. The latter is proposed as lectotype.

Literature

Bentham (1868) 459; Mueller (1868) 146; Mueller (1882) 96; Tate (1890) 145; Mueller & Tate (1896) 373; Maiden (1897) 16; Maiden (1901) 660; Cambage (1901) 327; Dixon (1906) 223; Haviland (1911) 529; Maiden & Betche (1916) 181; Black (1926) 499; Hurst (1942) 369; Black (1957) 752; Symon (1977) 50-51.

A dwarf herbaceous *perennial* to 10-15 cm high; stems with few branches and flowering close to base; prickles 5-8 mm long, straight, reddish, scattered on stems, petioles, leaf surfaces, peduncles and calyx; all parts covered with close tomentum of stellate hairs (sessile porrect-stellate, with a long central ray), also minute simple glandular hairs; general aspect rusty green, leaves concolorous. *Leaves* 3-4.5 cm x 1.5-3.5 cm, ovate, with 7-9 main lobes, sinuses shallow and rounded, cut to one third or less of way to midrib, lobes themselves rounded or with undulate margin, leaf base truncate or rounded; petiole 1.5-4 cm long. *Inflorescence* a 2-7-flowered cyme; peduncle 1 cm long (to first flower); floral rhachis 2-6 cm long; pedicels 1-2.5 cm long. *Calyx* tube 2-3 mm long, prickly; lobes 3-6 mm long, broad-lanceolate, scarcely prickly. *Corolla* 2.5-3.0 cm diam., broadly stellate, lobes cut to half way, interacuminal tissue not well developed, lobe apex rounded, acumen scarcely developed. *Filaments* (Fig. 163) 1-2 mm long; anthers 4-5 mm long, stoutly lanceolate, divergently erect, dark-tipped at least in age. *Ovary* globular to broadly conical, glabrous or with few glandular hairs towards summit; style 5-10 mm long, erect, firm, flushed pale purple about middle, stigma capitate, bluntly bifid, green, upper portion of style and stigma slightly bent to one side but not hooked. *Berry* (Fig. 152) rare, ?greenish, calyx covering base of fruit. (Fig. 73.)

Chromosome number: unknown.

Notes

Although the name has been used and applied widely, typical plants were not recollected until recent times at Napperby near Nelshaby east of Pt Pirie in S.A., Symon (1977). It is probable that *S. eremophilum* is a hybrid between *S. petrophilum* and *S. esuriale*. One of the few other collections to which the name can be applied with any confidence is that from Floods Creek near Broken Hill where the two postulated parents also occur. More work is needed to establish the hybrid nature of the plant but its intermediate morphology, relative infertility, and restricted distribution support the proposition. However, there are a few collections e.g. *Morris s.n.* 17.x.1924, Hermidale (ADW, NSW) that are also very close but do not occur in an area where *S. petrophilum* grows. It is possible that this represents a plant of *S. adenophorum*. The latter, which is also inadequately understood, is very similar in many characters. If *S. eremophilum* is not a hybrid then an extremely tenuous distribution remains to be explained.

Distribution and habitat (Map 12)

S.A.: Nelshaby-Napperby east of Pt Pirie on local patches of heavy dark 'Bay of Biscay' soils.

Selected specimens (total seen about 10)

NEW SOUTH WALES: *Cullen s.n.*, Aug. 1974, Floods Creek (ADW); *Morris 1247*, 17.x.1924, Hermidale (ADW, NSW).

SOUTH AUSTRALIA: *Mueller s.n.*, Oct. 1851, Nelshaby (MEL); *Meirs s.n.*, 7.xi.1967, Napperby (ADW); *Symon 10609*, 14.xi.1976, Napperby (AD, ADW, CANB, K, NSW).



Fig. 73. *Solanum eremophilum* F. Muell. Drawn from herbarium specimen, ADW 12706, collected by A. Morris about 48 km west of Nyngam on road to Cobarr, NSW. $\times \frac{2}{3}$.

69. *Solanum lacunarium* F. Muell., Trans. Philos. Soc. Vic. 1 (1885) 18-19.

Type citation: "In lagoons which are dry during the summer season near the junction of the river Darling and Murray".

Type material: The sheet, MEL 11745, has two labels. One bears the inscription "*Solanum lacunarium* Ferd. Mueller. In lacunis exsiccatis ad junctn fl. Darling & Murray . . . Dec. 1853, Dr. M.". The second label lists four numbered differences from *S. cinereum*. An isotype at K bears a label which reads "*Solanum lacunarium* Ferd. Mueller Ad junctionum fl Darling & Murray Dr. Ferd. Mueller". The sheet MEL 11745 is here proposed as lectotype.

Literature

Mueller (1855) 18-20; Mueller (1856) 166; Bentham (1868) 461; Mueller (1868) 146; Mueller (1882) 96; Mueller (1888) 362; Tate (1890) 145; Moore (1893) 334; Dixon (1906) 223; Maiden & Betche (1916) 181; Black (1917a) 646; Black (1926) 498; Ewart (1931) 1005; Willis (1972) 553.



Fig. 74. *Solanum lacunarium* F. Muell. Drawn from field grown plant at the Waite Institute, from roots collected by D.E. Symon from Mundy Creek, SA (ADW 40793). $\times 2/3$.

An erect or sprawling, clonal, herbaceous *perennial* 5-25 cm tall, somewhat sparsely branched, or an erect simple stem; prickles to 5 mm long, unequal, straight or slightly recurved, some flattened or broad based, almost always conspicuous and rich reddish-brown, abundant on petioles, leaf surfaces, less common on stem, peduncles and pedicels; all parts with tomentum of close, minute, stellate hairs (sessile porrect-stellate with short central cell), sparse on stems and upper leaf surface, dense below; general aspect sometimes reddish due to prickles, leaves discolorous. *Leaves* variable in size and lobing, smaller leaves may be 1 x 0.5 cm, larger leaves to 7 x 3 cm, elliptic, with 5-9 lobes, shallow or deeply cut (to midvein), lobes 2-15 x 1.5-4 mm, oblong, entire or with shallow lobes, sinues broad and rounded, leaf and lobe apices rounded, base cuneate to truncate, usually oblique; petiole (0.5) 1.5 (3) cm long. *Inflorescence* a cyme, occasionally branched, of 4-10 flowers; peduncle 1-3 cm long; floral rhachis 1-3 cm long; pedicel c. 1 cm slender. *Calyx* tube 2-3 mm long, lobes short, triangular. *Corolla* 1.5-3 cm diam., 4-5-partite, rotate-pentagonal, blue. *Filaments* (Fig. 163) 1-2 mm long; anthers 3-4 mm long, oblong-attenuate, loosely erect to divergent. *Ovary* 1 mm long, globular; style c. 7 mm long, erect; stigma green. Fruiting peduncle and axis lengthened to 12 cm, maturing (1-) 3-4 (-8) fruit; pedicels 1-1.5 cm long, deflexed; calyx somewhat enlarged to cover base of fruit, lobes broad-triangular; *berry* (Fig. 152) 1-1.5 cm diam., globular or depressed-globular, marbled-green, later pale yellow, not notably succulent. *Seeds* 3-4 mm long, (relatively large), very light grey, minutely pitted, 10-16 per fruit. (Fig. 74.)

Chromosome number: $n = 12$ Randell & Symon (1976).

Notes

The inland population varies in having larger leaves with coarser lobes and a measurable degree of change has occurred between these and the river population. The plants from the River Darling tend to be smaller and have narrower leaves and lobes. The species is perhaps most closely related to *S. adenophorum* which also has a scattered disjunct distribution. From that species *S. lacunarium* differs in having shorter, redder prickles, smaller more lobed leaves, fewer glandular hairs and paler blue flowers.

Distribution and habitat (Map 1)

This species has a disjunct distribution with populations on the flood plains of the Frome River and adjacent creeks between Lyndhurst and Marree (a few early collections near Lake Eyre) S.A., and an attenuated distribution along the Rivers Darling and Murray, from Dalby on the Condamine in Qld to Renmark in S.A. It is found on heavy soils of the river flood plains.

Selected specimens (total seen about 40)

QUEENSLAND: *Kelsey* 64, 15.ix.1958, 6-8 km S of Dalby (BRI).

NEW SOUTH WALES: *Dallachy & Goodwin s.n.*, 1858, Darling River (CGE, E, K); *Symon* 6744, 21.vi.1969, Menindie (ADW, B, CANB, NSW, US).

VICTORIA: *Beauglehole* 40630, 19.x.1972, Lindsay Island (acb, ADW, MEL).

SOUTH AUSTRALIA: (i) Inland populations: *Symon* 4046, 4.iii.1966, Mundy Creek (ADW, BIRM, CANB, K, NSW); *Symon* 11244, 2.x.1978, Margaret River near Coward Springs (ADW, BH); (ii) River Murray population: *Eichler* 13786, 20.iv.1957, 6.5 km W of Berri (AD, ADW); *Symon* 11579, 13.x.1979, Junction of Moolamon and Chowilla Creek (AD, ADW).

70. *Solanum terraneum* Symon, sp. nov.

Herba perennis parva, caules 1-5 (-10) cm longi, sparsim ramosi. Aculei usque 3-5 mm longi, tenues, recti, in caule et petiolo. Partes omnes pilis stellatis dense pubescentes. *Folia* 2-6 x 1-4 cm, integra, ovata vel elliptica; petiolus 1.5 cm longus; ad aspectu generali incano discolori. *Flores* 1-3 in brevi pedunculo usque 5 mm longo; pedicellus 1.5-2.5 cm, longus erectus; tubus calycis 2-3 mm longus; lobi calycis 3-5 mm longi, anguste

triangulares vel lineares. *Corolla* circa 2 cm diametro stellata; lobi 10 x 2-3 mm, reflexi, caesii; filamenta circa 1 mm; antherae 5 mm longae, lanceolatae, divergentes; ovarium pilis stellatis pubescens; stylus 5-7 mm longus infra pubescens; stigma capitatum. Pedicellus fructifer deflexus; calyx minime auctus et basin fructus tegens; *bacca* 8-10 mm diametro, globosa vel elliptica, matura pallide viridis.

Holotypus: PERTH. Isotypi: ADW, CANB, K, MO. D.E. Symon 9932, 12.v.1975, Western Australia, 61 km south of Agnew, $\pm 28^{\circ}25' 120^{\circ}50'$. "On red sand plain with *Danthonia*, *Eragrostis* much dead *Acacia* and low shrubs". (Fig. 65.)

A dwarf, clonal herbaceous *perennial*; stems 1-5 (-10) cm long, sparsely branched, with or without scattered fine straight prickles 3-5 mm long on stems and petioles; all parts with dense, close tomentum of stellate hairs (multiseriate-stalked, porrect-stellate with long central ray). *Leaves* 2-6 x 1-4 cm, ovate or oval, base cuneate, rounded or subcordate, apex rounded or acute, margin entire; petiole 1.5 cm long, general aspect grey-green, slightly discolorous. *Inflorescence* a solitary flower or 2-3 on short peduncle to 5 mm long; pedicel 1.5-2.5 cm long, erect at flowering. *Calyx* tube 2-3 mm long; lobes 3-5 mm long, narrow-triangular to linear. *Corolla* 2 cm diam., stellate; lobes 10 x 2-3 mm, reflexed, pale blue. *Filaments* (Fig. 163) c. 1 mm long; anthers 5 mm long, lanceolate, divergent. *Ovary* pubescent with stellate hairs; style 5-7 mm long, pubescent below, stigma capitate. Fruiting pedicels curved downwards; calyx slightly enlarged to cover base of fruit; *berry* (Fig. 152) 8-10 mm diam., globular to oval, pale green. (Fig. 75.)

Chromosomes: $n = 24$ Randell & Symon (1976) as "sp. nov." No. 6, Agnew, W. Aust.

Notes

This is one of the smaller Australian *Solanum* species and is comparable with or smaller than *S. esuriale* and *S. eremophilum*. It has affinities with *S. ellipticum* from which it differs in its dwarfer habit, broader more ovate leaves, short peduncle and more deeply stellate corolla and hidden fruits. It differs from *S. eremophilum* in its entire leaves, reduced prickles and smaller calyx. It is of interest that it has only been collected in recent times, but it is an inconspicuous plant particularly in dry conditions and occurs in an area as yet inadequately sampled botanically.



Fig. 75. *Solanum terraneum* Symon. Drawn from herbarium specimen, George 4530, from White Cliffs east of Laverton, WA (PERTH). $\times 2/3$.

Distribution and habitat (Map 3)

W.A.: a few scattered collections from the south western margins of the Victoria Desert, collected from red sand plains with arid grasslands or sparse arid woodlands.

Selected specimens (all cited)

WESTERN AUSTRALIA: *Merrall s.n.*, 1888, Golden Valley (MEL); *Cleland s.n.*, 31.viii.1948, Glenorn near Malcolm (AD); *George 4530*, 30.vi.1963, between Whitecliffs homestead and Woolshed, E of Laverton (ADW, PERTH); *Smith-White s.n.*, Aug. 1967, 110 km N of Kalgoorlie (ADW); *Carr s.n.*, 26.iii.1968, Morapoi Stn, 16 km SW of Kookynie (ADW, PERTH); *Chinnock 1124*, 18.ix.1973, 48 km W of Coonana near Cardonia Rocks (AD); *Symon 9932*, 12.v.1975, 61 km S of Agnew (ADW, CANB, K, MO, PERTH); *Symon 9975*, 14.v.1975, 31 km W of Wiluna (ADW, CANB, L, MO, PERTH).

71. *Solanum ellipticum* R. Br., Prodr. (1810) 446.

Type citation: "(T) v.v.". T denotes Littus intra Tropicum i.e. the north east coast of Australia.

Lectotype: The sheet at BM bears the Bennett number 2674 and "12 *Solanum ellipticum* prodr 446 Breadsound Sept. 25 desc 27 = 1802 No. 98 Desc." of Brown. There is an isotypic fragment of this at MPU.

Solanum lithophilum F. Muell., *Linnaea* 25 (1852) 434.

Type citation: "In pascuis lapideo-argillaceis inter sinum Spenceri et montes Flindersii, nonnumquam in collibus saxosis ad Cudnaka".

Type specimens: At MEL are two sheets with the following labels; MEL 11873, "Au felsigen platzen bei Cudnaka Oct. 51", "pl. humilis diffusa, fol., tomentos. Coroll. violacea interdum quadrifidas antherae luteae, styl violac. curvatus, stigma capitellat. viride. Aculei dilute fulvi Oct. 51" and "*Solanum ellipticum* R. Br. Flinders & Elders Range 1851". The second sheet MEL 11874 has, "*Solanum lithophilum* F. Muell. S. elliptico approximandum, Ad pedes mountain Flinders ranges. N. Holl. austr. Col. Nov. 51 ferd. Mueller". I propose the first to these MEL 11873 as lectotype. At P are two sheets bearing the labels "*Plantae Muellerianae. Solanum Lithophilum* F. Muell Nov. Holland meridionae. Flinders Range" and a second label "Herb. Mus. Paris Herbar E. Drake Nlle Hollande Australe. Collection Muller 1852". These are probably isotypes as the material is uniform and looks like a single collection.

Solanum ellipticum var. *mollibaccalis* J.M. Black, *Trans. & Proc. Roy. Soc. S. Aust.* 52 (1928) 227.

Type citation: No collection was cited at time of publication. A collection annotated by Black, *F.D. Warren s.n., s.d.*, Finnis Springs near Lake Eyre, is at AD.

Type material: AD 97614116.

Solanum ellipticum var. *chillagoense* Domin, *Biblioth. Bot.* 89 (1929) 1142.

Type citation: "Nord-Queensland: bei Chillagoe, am Eingange in die Karsthohlen (Domin 11. 1910)".

Type material: PR 530913-14 and photos ADW. In addition to the typed label, the sheet has a handwritten label "*Solanum* n. sp. affine *elliptico* . . . foliis multo majoribus subacuminatis inflores . . . + composito recedit. Foliis *quadriloculare* revocat".

Solanum ellipticum var. *horridum* Domin, *Biblioth. Bot.* 89 (1929) 1142.

Type citation: "Nord-Queensland: Hugel bei Cloncurry (Domin 11. 1910)."

Type material: PR 530917 and photo ADW. A prickly form of the species.

Solanum ellipticum forma *albiflora* Domin, *Biblioth. Bot.* 89 (1929) 1142.

Type citation: "Karst-hugel bei Chillagoe (Domin 11. 1910)".

Type material: Possibly at PR. Not seen. Occasional white-flowered forms have been seen in several species of *Solanum* and scarcely warrant nomenclatural distinction.

Literature

Brown (1810) 446; Dunal (1813) 183; Dunal in Poiret (1814) 777; Dunal (1816) 27; Don (1837) 424; Walpers (1844) 68; Dunal in DC. (1852) 298; Bentham (1868) 464; Mueller (1868) 145 as *lithophilum*; Mueller (1882) 96; Bailey (1883) 347; Tate (1890) 145; Mueller & Tate (1896) 373; Deane (1893) 329; Moore (1893) 335; Koch (1898) 114; Maiden (1898c) 37; Maiden (1899) 625; Bailey (1901) 1091; Dixon (1906) 223; Haviland (1911) 529; Bailey (1913) 357; Black (1914) 407; Black (1915) 835; Maiden & Betche (1916) 181; Fitzgerald (1918) 102; Ewart & Davies (1917) 242; Collins (1923) 247; Collins (1924) 9, 11, 17; Black (1926) 499, 696; Domin (1929) 1141; Cleland & Johnson (1933) 113; Cleland (1932) 36-38; Dadswell (1934) 13-18; White

(1937) 230; Hurst (1942) 369; Webb (1948) 158; Webb (1949) 50; Webb (1952) 94; Irvine (1957) 128; Chippendale (1960) 37-41; Everist (1974) 468; Grieve & Blackall (1975) 602.

Common name: potato bush

A sprawling, colonial, perennial *herb*, 15 cm to 1 m diam., woody at base but stems not lasting more than a few years; all parts pubescent with pale, dense, stellate hairs, somewhat floccose on the stems and under sides of leaves, general aspect pale or grey green; leaves slightly discoloured, growing tips often tinged purple; prickles to 1 cm,



Fig. 76. *Solanum ellipticum* R. Br. Drawn from pot grown plant at the Waite Institute, from Briggs 2731, collected 17 km west-south-west of Wilcannia, on the Barrier Highway, NSW (ADW 42136). $\times 2/3$.

unequal, fine, straight, pale or dark, scattered or abundant on stems, petioles and peduncles, sparse or absent on upper and lower leaf surfaces and calyx. *Leaves* variable in size may be quite large on vigorous growths (3-) 6 (-10) x 2-3 (5) cm, ovate to elliptic, entire or with undulate, repand margin, apex acute to acuminate; base cuneate to subcordate, oblique; petiole 1-5 cm long. *Inflorescence* a cyme of 1-6 flowers from an extra-axillary position; peduncle 1-8 cm long; pedicels to 1 cm long. *Calyx* tube 3-4 mm long; lobes triangular, acumens linear, together 1 cm. *Corolla* 2-3 cm diam., rotate to rotate-pentagonal, purple. *Filaments* (Fig. 164) short; anthers c. 4 mm long, oblong, stout. *Ovary* glabrous; style 8 mm long, hooked; stigma slightly bilobed. Fruiting peduncles 1-8 cm long; pedicels 1.5-2 cm long, slightly thickened upwards, usually deflexed; calyx covering base of fruit, lobes broadly triangular, acumens sometimes equalling the fruit; *berry* (Fig. 152) 1.5-2 cm diam., globular or slightly obovoid, finally pale yellowish-green, often with a tinge of purple, slightly translucent when ripe. *Seeds* 2-2.5 mm long, pale. (Fig. 76.)

Chromosome number: $n = 12$ Randell & Symon (1976); in addition Redgen 030, Aroona Valley, S.A. and Symon 10382, Harry Crk., N.T. have also agreed with this count.

Notes

Solanum ellipticum is a widespread and variable species, and has been treated here as a single complex. Extreme forms within this complex differ considerably but simple separation of them has not been achieved. The principal components of the complex are:

- a. Typical form, moderately prickly, relatively large leaved, widespread in drier Australia, all States except Vic. and Tas.
- b. Prickly form, well developed in the central Australian range systems and always associated with rocky outcrops. This form may approach *S. horridum* Dun.
- c. Small leaved form, well developed in the upper Eyre Peninsula mainly west of the Flinders Ranges and extending to the Nullarbor Plain, tending to be more slender, and have smaller leaves with more marked undulate margins. It contrasts most markedly with the very prickly central Australian forms.

Four species are closely related to *S. ellipticum*. They are *S. terraneum* which occurs on the western margins of the species distribution and may represent one of the several populations now disjunct in Western Australia. *S. terraneum* differs in the small size, reduced prickles, reduced inflorescence and stellate corolla. *S. horridum* Dun. in W.A., may also represent a species isolated and evolved from the prickly forms in the central Australian ranges. *S. horridum* differs principally in its larger, almost sessile fruits. *S. cleistogamum*, which occurs in Western and central Australia with isolated collections from N.S.W. and S.A., tends to be more slender in many of its parts, the flowers smaller and often cleistogamous. Very prickly forms of this species link it with prickly forms of *S. ellipticum* in central Australia but *S. cleistogamum* differs from these in its smaller flowers, and usually longer peduncles. *S. dianthophorum* occurs towards the northern and north eastern margins of the distribution of *S. ellipticum* from which it differs in leaf shape (variable in both), shorter fruiting peduncles, and more stellate corollas.

All the forms of *S. ellipticum* and related species have succulent fruits which are pale green or flushed with purple and may be slightly translucent when quite ripe. All have pale buff or parchment coloured seeds. The name *S. ellipticum* has been widely and loosely applied to many *Solanum* collections.

Distribution and habitat (Map 13)

All States, except Vic. and Tas. Widespread throughout arid Australia principally in the arid range systems but also occurring on plains on both heavy and sandy soils. Generally absent from flood plains.

Selected specimens (total seen about 375)

WESTERN AUSTRALIA: a. Typical form: *Symon* 2288, 1.viii.1962, Sir Frederick Range (ADW); *George* 8945, 26.vii.1967, Mt Tietkens (ADW, PERTH); b. Prickly form: *Briggs* 3582, 9.vi.1970, Lightning Rocks E of Warburton (ADW, NSW); *Howard s.n.*, 8.vi.1968, Gorge E of Mt Russell (ADW, PERTH); *Smith-White s.n.*, Aug. 1967, Deane Range (ADW, SYD).

NORTHERN TERRITORY: a. Typical form: *Chippendale* 2535, 16.viii.1956, Harper Springs (ADW, NT); *Campbell s.n.*, Aug. 1966, Yuendumu (ADW, NSW); *Carolyn* 5062, 2.viii.1966, Ross River (ADW, SYD); *Beaglehole* 22853, 28.vi.1967, Mt Connor (acb, ADW); b. Prickly form: *Beaglehole* 27666, 26.vii.1968, Ooraminna Rock Hole (acb, ADW); *Latz* 3128, 20.vii.1972, Palm Valley (ADW, NT); *Latz* 5053, 29.iv.1974, Mt Fraser, Mulga Park (ADW, NT); *Latz* 5581, 2.vii.1974, Central Mt Stuart (ADW, DNA, NT).

QUEENSLAND: Typical form: *Swan* 110, Aug. 1974, near Lake Moondara NW of Mt Isa (ADW, BRI); *Browning s.n.*, Sept. 1966, Durham Downs (ADW); *Browning s.n.*, Sept. 1966, Windorah (ADW, BRI).

NEW SOUTH WALES: Typical form: *Constable* 4494, 12.x.1963, Mt Oxley, ESE of Bourke (ADW, NSW); *Constable* 4583, 20.x.1963, W of Wanaaring (ADW, NSW); *Briggs* 2688, 18.v.1969, Boppy Mtn E of Cobar (ADW, NSW); *Briggs* 2731, 21.v.1969 WSW of Wilcannia (ADW, NSW).

SOUTH AUSTRALIA: a. Typical form: *Symon* 5752, 19.viii.1968, Innamincka (ADW, BRI, CANB, K); *Symon* 6003, 24.viii.1968, Paralana, Flinders Ranges (ADW, B, CANB, E, MO, NSW); *Symon* 6770, 5.ix.1969, Wirrealpa (ADW, B, CANB, L); b. Prickly form: *Symon* 2595, 6.viii.1962, Mt Lindsay (ADW, K); *Symon* 2635, 10.viii.1962, Mt Woodroffe (ADW); *Beaglehole* 25465, 27.vi.1968, Everard Park (acb, ADW); c. Small-leaved form: *Hilton s.n.*, 24.viii.1965, Ooldea (ADW); *Symon* 4066, 28.ix.1966, Hesso Stn (ADW, BIRM, CANB, K, NSW); *Alcock* 2100, 8.iv.1968, N of Whyalla (ADW, CANB); *Symon* 8134, 3.x.1972, Dingo Hill, Gawler Ranges (ADW, CANB, MO).

72. *Solanum dianthophorum* Dunal, Hist. nat. *Solanum* (1813) 183; a name replacing *Solanum biflorum* R. Br., Prodr. (1810) 445, nom. illeg., non *S. biflorum* Lour., Fl. Cochinch. 1 (1790) 129.

Type citation: "(T) v.v.". T denotes Littus intra Tropicum—i.e. the north-east coast of Australia.

Lectotype: At BM is a sheet bearing the Bennett number 2668 and "6 *Solanum biflorum* prodr 445. In arenosis prope littus Port II ora orientalis" Port II is Port Clinton in Queensland.

Literature

Dunal (1813) 183; Poiret (1814) 762; Dunal (1816) 27; Don (1837) 424; Walpers (1844) 68; Dunal (1852) 192; Miquel (1857) 645; Bentham (1868) 455; Mueller (1882) 96; Bailey (1883) 345; Bailey (1901) 1086; Bailey (1913) 354; Domin (1929) 1138.

A sprawling perennial *herb* to 1 m long, not known to be clonal; prickles to 1 cm long, dark, scattered on stems and petioles, occasional on leaf surfaces, dense on calyx; all parts closely and densely pubescent with minute, stellate hairs (sessile or short multi-seriate stalked, porrect-stellate with medium to long central ray); general aspect green. *Leaves* slightly discoloured, 3-6 x 1.5-2.5 cm, elliptic, entire, margin slightly undulate, apex acute, base rounded, slightly oblique, petiole 2-3 cm long. *Inflorescence* a cyme of 1-6 flowers, sessile or on very short peduncle to 5 mm long; pedicel c. 5 mm long. *Calyx* tube prickly, lobes narrow-triangular to linear. *Corolla* 1.5-2 cm diam., stellate, open or reflexed, white or pale lavender. *Filaments* (Fig. 164) 1-2 mm long; anthers 4-5 mm long, tapered oblong, loosely erect. *Style* erect, bent at tip. Fruiting pedicels c. 1 cm long; calyx enlarged to cover base of fruit, lobes triangular, acumens to 5-6 mm long; *berry* (Fig. 152) 1-2 cm diam., globular, at first green, finally suffused purple, succulent, sometimes drying to a pale firm texture. *Seeds* 2.5 mm long, light brown, minutely reticulate on margin. (Fig. 77.)

Chromosome number: $n = 12$ Randell & Symon (1976); in addition plants grown from Webb & Tracey 8299, Redgen 045, Moriarty 1625.

Notes

This species is not always easy to distinguish from *S. ellipticum* R. Br. but differs in its generally stellate corolla, and shorter flowering and fruiting peduncles. The name has not been applied extensively in modern times and undoubtedly a number of identifications were made as *S. ellipticum* sens. lat.



Fig. 77. *Solanum dianthophorum* R. Br. Drawn from field grown plant at the Waite Institute, from seed from Redgen 044, collected at Glen Morgan, Qld (ADW 40975). $\times 2/3$.

Distribution and habitat (Map 9)

Qld in the south-east, reported in open scrubs on ridges, slopes, cleared woodland, creek banks in light brown soils.

Selected specimens (total seen about 15)

QUEENSLAND: *Gordon 7976*, 1970, Myall Park, Glen Morgan (ADW, B, CANB, K, L); *Moriarty 1466*, 1.ix.1973, near Yatton Creek (ADW, BRI, CANB, MO); *Moriarty 1626*, 4.x.1974, Turkey Creek (ADW, BRI, CANB, MO).

73. *Solanum cleistogamum* Symon, Trans. & Proc. Roy. Soc. S. Aust. 95 (1971) 227.

Type citation: D.E. Symon 5418, 1.vii.1967, about 32 km north of Onslow, Western Australia. "Common in small depressions in *Triodia* sand plain. Annual or short lived shrub, sprawling habit, possibly cleistogamous".

Holotype: PERTH. *Isotypes*: ADW, CANB, K, L.

S. petrophilum F. Muell. var. *pedicellatum* Ewart & Davies, Fl. Northern Territory (1917) 243, plate 21.

Type: G.F. Hill 435, 4.vii.1911, Lat. 19° long. 132° N. Terr. (about 193 km N. of the Lander). Two sheets MEL 12108, 12109.

A sprawling herbaceous *perennial* to 60 cm long, possibly clonal, sometimes annual, stems relatively slender; prickles to 8 mm long, slender, straight, pale, on stems, petiole, calyx, less common or absent on peduncle, pedicel and leaf surfaces; all parts with tomentum of close, dense, stellate hairs (mostly short multiseriate-stalked, porrect-stellate with short or medium central ray); general aspect grey-green. *Leaves* slightly discoloured, 3-8 x 2.5 cm, ovate to ovate-lanceolate, entire or repand with number of shallow, weakly developed lobes, sinus and lobe apices broad and rounded, leaf apex acute, base truncate to subcordate, usually very oblique. *Inflorescence* a 1-4-flowered cyme, basal flower often adjacent to stem, peduncle (if no basal flower) or floral rachis 1-4 cm long, flowers clustered towards end, pedicel c. 1 cm long. *Calyx* tube 2-3 mm long, prickly; calyx lobes 2-3 mm long, unarmed. *Corolla* c. 1 cm diam., rotate, pale lavender, frequently remaining unopened or opening tardily. *Filaments* (Fig. 164) 1.5-2 mm long, incurved; anthers 2.5-3 mm long. *Ovary* 1 mm diam., glabrous; style 5 mm long, pale, stigma green, at or below the level of anther pores. Fruiting peduncle 1.5-4 cm long; pedicel 2-2.5 cm long, usually markedly deflexed; calyx enlarged to cover base of fruit; mature *berry* (Fig. 152) c. 1 cm diam., globose, finally pale yellow-green, or slightly flushed purple, succulent, slightly translucent, very aromatic, readily shed without pedicel. *Seeds* 2.5-3 mm long, light brown, minutely reticulate; 17 fruits from plants in cultivation from Symon 5418 had (27-) 40 (-54) seeds per fruit, 6 fruits from Symon 5469 had (54-) 71 (-85) seeds per fruit. *Cotyledons* about 14 x 5 mm, lanceolate, sparsely glandular-ciliate, hypocotyl and petiole pubescent, first true leaf ovate, glandular-ciliate and with stellate hairs. (Fig. 78.)

Chromosome number: $n = 12$ Randell & Symon (1976).

Notes

S. cleistogamum is closely related to the cluster of species in the *S. ellipticum* R. Br. complex. The cleistogamous tendency is somewhat variable depending on particular populations and environmental conditions. The ripe fruits are much sought after by the Aborigines and it is one of the most relished of the central Australian species. Morphological variation occurs particularly in the abundance of prickles and specimens from exposed sites, e.g. stony plateaux, are often conspicuously armed.

Distribution and habitat (Map 3)

W.A. and N.T. in varied sites ranging from rocky outcrops, screes and slopes to depressions in sand plains or in creek line gravels; there are two isolated collections from N.S.W. and S.A.

Selected specimens (total seen about 60)

NORTHERN TERRITORY: *McKee* 8636, 24.ii.1961, 4 miles SE of Mt Allan (ADW, CANB); *Chippendale s.n.*, 31.vii.1958, Curlew Waterhole (ADW, CANB, NSW, NT); *Latz* 4971, 26.iv.1974, Erldunda Stn (ADW, CANB, NT); *Latz* 5086, 26.iv.1974, Mulga Pk Stn (AD, ADW, NT).

WESTERN AUSTRALIA: *George* 5316, 23.vii.1963, N of Warburton (ADW, PERTH); *Symon* 5448, 4.vii.1967, N of Geraldton (AD, ADW, MEL, PERTH); *Symon* 5469, 5.vii.1967, NW of Menzies (ADW, CANB, K, NT, PERTH); *Beauglehole* 48910, 17.viii.1974, Mt. Bruce (acb, ADW).

NEW SOUTH WALES: *Jacobs* 2337, 10.x.1975, Fowlers Gap, N of Broken Hill (ADW, NSW).

SOUTH AUSTRALIA: *Symon* 10611, 14.xi.1976, Telowie Gorge (ADW) and cultivated material (AD, ADW).



Fig. 78. *Solanum cleistogamum* Symon. Drawn from pot grown plant at the Waite Institute, from seed from *Symon* 5418, collected 32 km north of Onslow, WA (ADW 40487). $\times \frac{2}{3}$.

74. *Solanum horridum* Dunal in Poir., Encyl. Meth. Bot. Suppl. 3 (1814) 763, No. 159.

Type citation: "Cette plante croit a la Nouvelle-Hollande (Dun. in herb. Mus. Paris)".

Type specimen: There are at P two sheets, one bears a single large portion of the plant and four labels. 1) Herb. Mus. Paris; 2) Isle Derousartt, Sollanum, Sollanum, espinez esoutes; 3) *Solanum horridum*, Syn. Sol. p. 28 of Decaine; 4) Prodr. nom. 687.1. *Solanum horridum* Dnls. Sol. (specimen typicum) Timor, A. Reidle.



Fig. 79. *Solanum horridum* Dunal. Drawn from pot grown plant at the Waite Institute, from seed from Symon 5403, collected 22 km south-east of Tambrey Stn, on the road to Wittenoom, WA (ADW 40386). $\times \frac{2}{3}$.

The second sheet consists of three pieces and bears three labels, 1) Herb. Mus. Paris; 2) *Solanum hispidum* no. 23 de monjour vol Isle des Amirally; 3) *Solanum horridum* Dunals, Prodr. no. 697, Cote occidentale de la Nvlle. Hollande. I propose this sheet as lectotype. The unpublished drawing at MPU, Dunal, Sol. ic. ined. t. 46 is based on this sheet.

The material is consistent with a single collection. A. Riedle explored with Baudin and died in Timor. I have seen other material of Australian solanums attributed to Riedle and Timor and suggest that there was confusion in the labelling after his death.

Solanum horridum β *repandifolium* Dunal in DC. Prodr. 13 (1852) 297.

Type citation: "In Nova Hollandia. (cap. Baudin, in h. Banks)".

Type material: BM and photo ADW. The material is consistent with the type collection. The single small piece is labelled "Capt. Baudin New Holland" on the back of the sheet and on the front at the bottom is written in pencil "S. horridum Dun. syn. β repandifolium Dun. in DC. Prodr. 13.1.297".

Literature

Poiret (1814) 763; Dunal (1816) 28; Don (1837) 424; Walpers (1844) 68; Dunal in DC. (1852) 296; Miquel (1857) 650; Bentham (1868) 462; Mueller (1882) 96; Ewart & Davies (1917) 243.

A sprawling *shrub* to 1 m across, probably short-lived, not known to be clonal; prickles to 1 cm long, pale, slender, straight, abundant on stems, petioles, peduncles and calyces, sparse or absent on upper and lower leaf surfaces; all parts pubescent with close, dense, pale or rusty stellate hairs (sessile to long multiseriate-stalked, porrect-stellate with short to long central cell); general aspect pale or yellowish green. *Leaves* lightly discolorous, 3-8 x 2-4 cm, ovate to ovate lanceolate, margin entire or slightly undulate to repand, veins impressed above, apex acute, base rounded to subcordate, oblique; petiole 1-3 cm long. *Inflorescence* a 1-3-flowered cyme from an extra-axillary position; peduncle to 1 cm long, frequently absent; pedicel 5-10 mm long, stout. *Calyx* tube c. 5 mm long, very prickly; lobes c. 5 mm long, linear. *Corolla* 1.5-2 cm diam., rotate. *Filaments* (Fig. 164) 1 mm long; anthers 3 mm long. *Style* c. 5-6 mm long; stigma slightly bilobed. Fruiting pedicel c. 1 cm long, stout, recurved; calyx covering base of fruit, mid-vein of lobe conspicuous, lobes and acumens c. 10-15 mm long, not exceeding the fruit; *berry* (Fig. 152) 2 cm diam., globular or depressed globular, at first green or suffused purple, finally dull yellow-green, drying brownish. *Seeds* 2-2.5 mm long, dark grey-brown, minutely reticulate on slightly thickened margin, 130, 210, 431, 438, 498 in five fruits examined. (Fig. 79.)

Chromosome number: $n = 12$ Randell & Symon (1976).

Notes

S. horridum is related to the *S. ellipticum* R. Br. complex and the name has frequently been misapplied to prickly forms of both *S. cleistogamum* and *S. ellipticum*, from both of which it may be distinguished by its larger, usually solitary fruit on a short peduncle and/or pedicel.

Distribution and habitat (Map 7)

W.A., Hamersley Ranges and adjacent areas. The species appears restricted in its distribution and has most often been collected from low stony rises and hills often dominated by *Triodia* and open *Acacia* woodlands.

Selected specimens (total seen about 20)

WESTERN AUSTRALIA: *Symon* 5403, 30.vi.1967, 22 km SE of Tambrey Stn (ADW, B, CANB, K, NSW, PERTH); *Symon* 10064, 18.v.1975, Plateau top, Yampire Gorge (ADW, K, MO, PERTH).

75. *Solanum echinatum* R. Br., Prodr. (1810) 447.

Type citation: "(T) v.v.". T denotes Littus intra Tropicum i.e. the coast of Queensland and Northern Territory westward to Arnhem Bay.

Lectotype: At BM is a sheet bearing the Bennett number 2681 and the label "19 *Solanum echinatum* prodr. 447, Carpentaria Island h No. 17 desc lect. Decr. 16: 1802 desc do 17" Island h is North Island, Sir Edward Pellew group. There is isotype material of this collection at E, K, MEL, MPU.



Fig. 80. *Solanum echinatum* R. Br. Drawn from pot grown plant at the Waite Institute, from seed from Symon 5155, collected 16 km south-west of the East Alligator River Crossing road to Oenpelli, NT (ADW 40490). $\times \frac{2}{3}$.

Solanum ellipticum var. *pannifolium* A. Cunn. ex Benth., Fl. Austral. 4 (1868) 464.

Type citation: "Cambridge Gulf, N.W. Coast, A. Cunningham".

Type material: At K a sheet of 3 pieces with the labels "Solanum pannifolium Camb. Gulf", and "Solanum pannifolium N.W.C." at BM a sheet of two pieces with the labels "Cambridge Gulf 1819", "A. Cunningham Solanum pannifolium", "422", and written on the bottom of the sheet "Solanum ellipticum Br. var. pannifolium Benth. in Fl. Austr. iv 464" here proposed as lectotype, photos ADW. A robust form from which the fruits have been shed.

Solanum wilkinsii S. Moore, J. Bot. 64 (1926) 95.

Type citation: Hab. Groote Eylandt. March 1925. 131.

Holotype: At BM is a sheet with the labels "No. 131 W.A.I.E. Groote Eylandt N.T. Aust March 1925, S.H. Wilkins". Above this label is a printed type specimen label. The material consists of three large and one small piece. The second label bears the inscription "No. 82 W.A.I.E. Groot Eylandt N.T. Aust, Feb. 1925, S.H. Wilkins".

Literature

Brown (1810) 447; Dunal (1813) 183; Poiret (1814) 777; Dunal (1816) 28; Don (1837) 424; Walpers (1844) 68; Dunal in DC. (1852) 297; Bentham (1868) 463; Mueller (1868) 145; Mueller (1882) 96; Bailey (1883) 347; Tate (1897) 71; Bailey (1901) 1090; Bailey (1913) 357; Ewart & Davies (1917) 242; Fitzgerald (1918) 102; Gardner (1923) 89.

An annual or short-lived erect *herb* to 50 cm tall, or more often nearly prostrate, to 2 m across, relatively slender, scarcely woody at base, not known to be clonal; prickles 4-6 mm long, fine, straight, pale or reddish, scattered or abundant on stems, petioles, peduncles and calyces, rare or absent elsewhere; all parts pubescent with close, dense, stellate hairs (sessile to long multiseriate-stalked, porrect-stellate with medium to long central ray), general aspect bright rusty-green (rarely grey-green), slightly discoloured. *Leaves* (2-) 4 (-8) x (1-) 2 (-3) cm, variable in size, ovate to ovate-lanceolate, usually entire or slightly repand near base, base rounded to cordate, usually oblique, apex acute, petiole (0.5-) 2 (-5) cm long. *Inflorescence* a cyme of c. 5 flowers; peduncle to 4 cm long; floral rachis 1-2 cm long; pedicel c. 1 cm long. *Calyx* tube c. 3 mm long, usually prickly but upper calyces may be almost unarmed; lobes 2 mm long, triangular. *Corolla* 2-3 cm diam., broadly stellate-pentagonal, petal tips exceeding interacuminal tissue. *Filaments* (Fig. 164) 1-2 mm long; anthers 4-5 mm long, loosely erect. *Style* c. 1 cm long, sigmoid, eccentric; stigma terminal and bent, both lavender. *Fruiting peduncles* 2-4 cm long, bearing 1-4 fruits usually close to ground; pedicels 1-1.5 cm long; fruiting calyx tube to 1.5 cm diam., enlarged to cover fruit, very prickly, orifice and calyx lobes small; *berry* (Fig. 153) 1-1.5 cm diam., distinctly depressed globular, somewhat square or 4-lobed, 4-locular, pale ivory-green, finally drying light brown, scarcely succulent shed with calyx and pedicel. *Seeds* about 2 mm long, minutely reticulate, dark liver-coloured, 14 fruits from three collections had (41-) 107 (-185) seeds per fruit. *Cotyledons* 9 x 4 mm, broad-lanceolate, first leaf 13 x 12 mm, broad ovate. (Fig. 80.)

Chromosome number: $n = 12$ Randell & Symon (1976); in addition Symon 7104, 7184 and 7185 also had $n = 12$ chromosomes.

Notes

This species is quite variable as accepted here and it is possible that new species may be recognised when adequate collections are available. Plants are usually rusty-pubescent or less frequently greyish, some very small leaved plants have also been collected and it is rarely clear whether this is a seasonal effect or reflects other causes. Prickles on the calyx vary in density and there is some evidence that cleistogamous forms occur. The fruits are finally shed when mature and plants collected in the dry season are often without fruits especially if they are small. *S. echinatum* is most closely related to *S. seitheae* from which it differs in its generally smaller stature. It is less

closely related to *S. lucani* from which it differs in its scarcely discoloured smaller leaves and stature, fewer flowers and fruits, firmer more prickly calyx and different ecology.

The prickly calyx and easily shed ripe fruit enable them to function as 'trample burrs' and this is a probable means of distribution. This mechanism also applies to the related species *S. seitheae*, but the fruits of *S. lucani* are not so readily shed.

S. echinatum generally appears to be an annual but one clump in the Kimberleys that had been scraped and exposed during roadmaking appeared to be clonal in habit.

Distribution and habitat (Map 4)

Northern tropical Australia from the Kimberley region of W.A. to the Gulf of Carpentaria in Qld as well as adjacent offshore islands. It is frequently found on rocky outcrops or on the sandy and alluvial debris at the base of outcrops.

Selected specimens (total seen about 60)

WESTERN AUSTRALIA: *Ritson* 26, Feb. 1959, Karunjie Stn (CANB); *Symon* 7104, 29.v.1971, near Theda Stn turn-off (ADW, CANB, K, NT).

NORTHERN TERRITORY: *Brown* (2681), 16.xii.1802, Carpentaria Island h (BM, E, MPU, P); *Specht* 239, 14.iv.1948, Groote Eylandt (AD, CANB, BRI, K, L); *Symon* 7189, 10.vi.1971, Pine Creek (ADW, B, BRI, CANB, K, NSW, NT).

QUEENSLAND: *Brass* 334, Oct. 1923, Settlement Creek (CANB, BRI); *Symon* 4995, 31.v.1967, Wernadinga Stn (ADW, B, BRI, CANB, K, US).

76. *Solanum lucani* F. Muell., Vict. Nat. 9 (1893) 175.

Type citation: "At Cambridge Gulf, Aug. *Lucanus*".

Lectotype: The collection at Melbourne has been mounted on three sheets each bearing the label "*Solanum lucani* F.v.M. Cambridge Gulf 1886, *A. Lucanus*". I propose MEL 11346 as lectotype. At K is an isotype with the additional label "Have only one flower and that partly damaged and one (perhaps) ripe fruit. *Solanum lucani*".

Solanum pubescens sensu Fitzgerald non Willd.

Fitzgerald (1918) reported collecting this species from Goody Goody near Derby, W.A. The collection, now at NSW, has since been identified as a white flowered form of *S. lucani* F. Muell.

A vigorous, sprawling, probably annual *herb*, to 30 cm high and over 1 m across; prickles to 8 mm long, unequal, pale, common on stems, peduncles, and calyx, less so on petioles, rare on leaves; all parts pubescent with close, minute, stellate hairs (sessile to long multiseriate-stalked, porrect-stellate with medium to long central ray), sparse on upper leaf surface, dense and silvery below, general aspect green or purplish-green, markedly discoloured. *Leaves* variable in size, on vigorous growths to 15 x 8 cm, later 5-10 x 3-6 cm, ovate, larger juvenile leaves with 7-9 shallow rounded lobes, later leaves entire, apex acute, base rounded to subcordate, very oblique, petiole (3-) 5 (-10) cm long. *Inflorescence* an erect cyme, rarely forked, of 10-15 flowers held above foliage; peduncle c. 5 cm long; floral rhachis finally 5-10 cm long; pedicels c. 1 cm long. *Calyx* tube 2-3 mm long, campanulate, prickly; lobes 1 mm long, obtuse, acumens scarcely developed. *Corolla* 2-2.5 cm diam., rotate, purple. *Filaments* (Fig. 164) 2-3 mm long; anthers c. 5 mm long, oblong, loosely erect. *Ovary* glabrous; style c. 8 mm long, pale, sigmoid, exerted to side of anthers; stigma capitate, green. Fruiting peduncle to 17 cm long, with up to 10 fruits, deflexed, held below leaves; pedicels c. 1.5 cm long, deflexed; calyx 1-1.5 cm diam., closely enclosing berry except for small orifice, acumens very short or not developed, all very prickly; *berry* (Fig. 153) 1-1.5 cm diam., globular, green. *Seeds* 1.5 mm long, dark brown, minutely reticulate particularly on margin (33-)

92 (-185) in 14 fruits examined. *Cotyledons* sparsely, minutely glandular, first true leaf broad-ovate, stellate haired. (Fig. 81.)

Chromosome number: $n = 12$ Randell & Symon (1976) and, in addition, $n = 12$ has also been counted by Randell for Symon 5189, 5268, 5311, 6976.



Fig. 81. *Solanum lucani* F. Muell. Drawn from pot grown plant at the Waite Institute, from seed from Symon 6976, collected 56 km west of Halls Creek, NT (ADW 42142). $\times \frac{2}{3}$.

Notes

Variations in size due to difference in vigor may be substantial. In addition, specimens collected from rocky outcrops away from stream lines tend to have smaller and narrower leaves. The species is related to *S. echinatum* from which it differs in its larger discolorous leaves, more abundant flowers and fruits and its ecology. From *S. seitheae*, to which it is less closely related, it differs in leaf and fruit characters.

Distribution and habitat (Map 9)

W.A. and N.T. The species occurs from about Willeroo Stn in N.T. westward to near Derby and Broome and mainly south of the King Leopold Range. It occurs on disturbed sites and particularly on sand bars and levees of the river systems. Less often it has been found on rocky outcrops, in the gravelly washes between rock masses.

Selected specimens (total seen about 60)

WESTERN AUSTRALIA: *Lazarides* 6310, 3.viii.1959, 21 km SW of Lamboo Stn (AD, CANB, NSW, PERTH); *Symon* 5262, 20.vi.1967, between Dunham River Homestead and Wilson River (ADW, B, CANB, K, PERTH, US).

NORTHERN TERRITORY: *Chippendale s.n.*, 9.v.1960, 48 km SW of Willeroo Stn (AD, ADW, NSW, NT); *Symon* 5216, 18.vi.1967, Victoria River Crossing (ADW, CANB, K, NT, US).

77. *Solanum seitheae* Symon, sp. nov.

Frutex perennis procumbens ad 2 m latus et 60 cm altus. Aculei 5-6 mm longi aciculares, rectae, pallidae, sparsae vel copiosae in caule, in petiolo, in pedunculo, in calyce. Omnes partes pilis stellatis densis pubescentes, adspectu generali griseo-viridi parum discolori. *Folia* 4-13 x 3-9 cm, ambitu ovata, 6 lobis exiguis rotundatis vel angularibus; petiolus circa 5 cm. *Inflorescentia*, cymosa; pauci usque 8 flores; pedicellus 1-2 cm; tubus calycis 5 mm, globularis, spinosus; lobi calycis 5-6 mm, triangulares; *corolla* circa 3 cm diametro, late stellata ad rotata, violacea; filamenta 1 mm; antherae 5-6 mm, cuneatim oblongae, erectae; ovarium glabrum; stylus 10-11 mm, minime sigmoideus; stigma parvum, terminale. *Bacca* 1-1.5 cm diametro, depressa globularis, 4-locularis, flavovirens tandem dura, ossea, fulva. *Semina* 2.5 mm longa, minime reticulata.

Typus: D.E. Symon 4959, 29.v.1967, 116 km SW of Normanton, top of the Donors Hills, Qld. In buckshot lateritic gravels, to 30 cm high and 2 m wide with *Eucalyptus terminalis*, assorted *Acacia* and *Aristida*. ADW 33274 (holotypus), B, BRI, CANB, K, NSW, US. (Fig. 82.)

A sprawling *perennial*, to 2 m across and 60 cm high, not known to be clonal, prickles 5-6 mm long, fine, straight, pale, scattered or abundant on stem, petioles, peduncles, and calyces, rare or absent elsewhere; all parts closely and densely pubescent with stellate hairs (stalked or sessile, porrect-stellate with long central ray) general aspect grey-green, slightly discolorous. *Leaves* 4 to 13 x 3 to 9 cm, variable in size, ovate, with up to 6 shallow, rounded or angular lobes, lobe apex rounded or acute, leaf apex acute or acuminate, sinuses shallow and rounded, rarely cut $\frac{1}{5}$ of way to midvein, leafbase oblique, rounded or cordate; petiole to 5 cm long. *Inflorescence* a cyme of to 8 flowers; peduncle to first flower to 5 cm long; floral rhachis to 5 cm long; pedicel 1-2 cm long; calyx tube 5 mm long, globular, prickly. *Calyx* lobes 5-6 mm long, triangular. *Corolla* c. 3 cm diam., broadly stellate to rotate, acumen exceeding interacuminal tissue, violet-blue. *Filaments* (Fig. 164) 1 mm long; anthers 5-6 mm long, tapered upwards, loosely erect. *Ovary* glabrous; style 10-11 mm long, weakly sigmoid; stigma small, terminal. Fruiting peduncle not much enlarged, fruits in clusters of 2-3 usually at ground level; calyx tube 2-2.5 cm diam., enlarged to cover fruit, often burst or torn irregularly, densely prickly with pale prickles, orifice small; calyx lobes neither enlarged nor prickly; *berry* (Fig. 153) 1-1.5 cm diam., depressed-globular, 4-locular, pale yellowish-green before drying hard, bony, pale brown. *Seeds* 2.5 mm long, minutely reticulate towards margins, seed numbers in 8 fruits (192-) 254 (-330). *Cotyledons* ovate, 9 x 4 mm, petiole 1 mm long, first leaf broad-ovate. (Fig. 84.)



Fig. 82. Holotype of *Solanum seilheae* Symon (Symon 4959, ADW).



Fig. 83. Holotype of *Solanum eardleyae* Symon (Latz 939, NT).

Chromosome number: $n = 12$ Symon & Randell (1976) as "sp. nov. No. 9", Symon 4959, Normanton, Qld.

Notes

It is most closely related to *S. echinatum* from which it differs in its larger size, subshrubby habit, generally grey pubescence, and larger flowers and fruits. It differs from *S. lucani* in its larger corolla, larger and fewer fruits and different ecology.



Fig. 84. *Solanum seitheae* Symon. Drawn from pot grown plant at the Waite Institute, from seed from Symon 4959, collected at Donors Hills, 116 km south-west of Normanton, Qld (ADW 40491). $\times 2/3$.

This species belongs to a trio of sprawling annual or short lived shrublets in which the clonal habit is rarely present. All have berries almost completely enclosed in an enlarged prickly calyx-tube. The fruits are shed onto the ground and are hard and bony when mature; all are quadrilocular and the seeds are dark brown to liver coloured. They occur in northern Australia from W.A. to Qld south of the Gulf of Carpentaria but are absent from Cape York Peninsula. The specific name honors Dr A. Seithe for her contribution to the knowledge of the pubescence of *Solanum*.

Distribution and habitat (Map 10)

North West Qld near the N.T. border in the vicinity of Riversleigh Station, and also in the Wessel Islands. It is restricted in its distribution and most of the few collections available have come from rocky or gravelly outcrops.

Specimens examined

QUEENSLAND: *Gittens* 762, May 1963, Calton (BRI, CANB); *Symon* 4959, 29.v.1967, Donors Hills (ADW, B, BRI, CANB, K, NSW); *Perry* 1440, 11.vi.1968, E of Riversleigh Stn (BRI, CANB, K, NT); *Tracey* s.n., May 1970, S of Lawn Hill Homestead (ADW); *Swan* 117, Aug. 1974, Mt Isa—Cloncurry Road, 60 km E of Mt Isa (ADW, BRI); *Swan* 124, Aug. 1974, 14.7 km N of Dajarra on road to Mt Isa (ADW, BRI); *Swan* 126, Aug. 1974, 96 km NE of Mt Isa on road to Julius Dam (ADW, BRI, CANB, K, MO).

NORTHERN TERRITORY: *Latz* 3488, 16.x.1972, Wessell Islands (ADW, BRI, NT); *Henshall* 275, 5.vi.1974, China Wall, Nicholson River area (ADW, BRI; not seen: CANB, DNA, NT).

78. *Solanum sturtianum* F. Muell., Trans. Philos. Soc. Victoria 1 (1885) 18-19.

Type citation: unlocalised collections by Capt. C. Sturt.

Type material: Three collections by Sturt have been located. At BM is a sheet labelled "Central Australia Captain Sturt 1844-6" and "No. 16". At MEL are two sheets (1) MEL 11650, labelled "Solanum sturtianum Ferd. Muell. In Nov. Holl austr interior leg. clar Capt. Stuart (sic) Jan. 10. 1848", (2) MEL 11651 "Solanum sturtianum Ferd. Mueller. In interiore Nov. Holl. austr. detexit honorabilis C. Sturt Hb. St 87 Coll. secretor (?) Nov. Holl. austral Ferd. Mueller Ph. Dr." and "S. sturtianum 12".

Lectotype: In view of the quality of the specimen I propose the collection at BM as lectotype.

Solanum sturtii (sic) F. Muell. An orthographic error used by Mueller, Trans. Phil. Soc. Vict. 1 (1855) 19.

Solanum tetrandrum R. Br. var. *angustifolium* A. Morrison, J. Bot. (1912) 275.

Type citation: Between Globe Hill and Minderoo, Ashburton River, A. Morrison, 7.x.1905.

Holotype: BM, *Isotype*: E.

S. morrisonii Domin, Biblioth. Bot. 89 (1929) 1131, based on *S. tetrandrum* var. *angustifolium*, this is a narrow leaved Western Australian form of *S. sturtianum*. It bears little relationship to *S. tetrandrum*.

Literature

Mueller (1855) 18-20; Mueller (1856) 165; Bentham (1868) 454; Mueller (1868) 146; Mueller (1882) 96; Tate (1890) 145; Mueller & Tate (1896) 373; Deane (1893) 329; Moore (1893) 333; Bailey (1901) 1086; Maiden (1901) 660; Dixon (1906) 222; Bailey (1913) 354; Black (1915) 835; Maiden & Betche (1916) 181; Ewart & Davies (1917) 243; Collins (1923) 247; Collins (1924) 9, 11, 17; Seddon & Carne (1925) 192; Seddon & Carne (1925a) 28-33; Black (1926) 498; Seddon (1930) 641; (1930a) 418; Hurst (1942) 375; Webb (1948) 160; Webb (1952) 94; Chippendale (1960) 41; Aurich (1966) 447; Green (1969) t. 543; Hill (1972) 299; Bremner, *et al.* (1973) 2559-2561; Everist (1974) 478.

An erect clonal *shrub* 0.5-1 (-3) m tall, stems lasting several years, often somewhat willowy, rarely intricately branched; prickles variable; plants sometimes without prickles or almost so, usually with prickles 5-6 mm long, scattered along stem sometimes (in W.A.) quite densely prickly, rarely on other parts; all parts pubescent with close dense tomentum of stellate hairs, (sessile, porrect-stellate with short central ray), more loosely pubescent in some W.A. specimens, general aspect silvery below, grey-green above, discolorous. *Leaves* 3-6 x 0.5-1.3 cm (narrow in some W.A. forms), lanceolate,

entire, sometimes slightly undulate but without lobes or teeth, apex acute or rounded, base rounded equal or oblique; petiole 0.5-1.5 cm. *Inflorescence* a cyme of few to 12 flowers; peduncle 1 cm long, short or absent; floral rhachis 5-6 mm long; pedicel 5-8 mm long. *Calyx* 3-4 mm, campanulate; lobes 1-2 mm, their apices rounded. *Corolla* rotate-stellate, 3-4 cm diam., often showy, lobes broad and rounded, interpetalar tissue well developed and equalling tips. *Filaments* (Fig. 164) 1-2 mm long; anthers 5-6 mm long, lanceolate, tapering, loosely erect. *Ovary* minutely glandular pubescent, style about 1 cm long, erect, slightly thickened towards apex, glandular pubescent towards base; stigma pale green. *Fruiting* pedicel firm; calyx not much enlarged; *berry* (Fig. 154) 1-1.5 cm diam., globular, at first marbled green later yellow to brownish-black, dry not fleshy, skin brittle and breaking irregularly. *Seeds* 3-5 mm, very dark brown to black, flat though twisted slightly, the margins distinct, raised and smooth, the faces with minute raised tubercles, ten fruits examined had (53-) 62 (-73) seeds. (Fig. 85.)



Fig. 85. *Solanum sturtianum* F. Muell. Drawn from field grown plant at the Waite Institute, from seed from P.D. Symon, collected near Broken Hill, NSW (ADW 40792). $\times 2/3$.

Chromosome number: $n = 12$ Randell & Symon (1976); in addition Barlow 1004, Redgen 031, Symon 1149, 3966, 3985, 5392, 5409, 5423, 8079, 8528 have all been counted as $n = 12$.

Notes

S. sturtianum is a widespread species and is much more variable in western and north-western Australia than in its more easterly areas. The western specimens vary greatly in leaf width where the extreme narrow forms have been called *S. morrisonii*. In this area there are also forms with denser pubescence and more numerous prickles. Occasional white-flowered forms have been found throughout the range of distribution. When in an advanced bud stage the corolla may exude nectar from glands on the back of the petal and the buds are actively worked by ants and honey bees both of which ignore the open flower. This phenomenon also occurs in *S. tudununggae* from Kalumburu on the north west coast. *S. sturtianum* does not appear to have close relatives amongst the Australian species of *Solanum*. The few that have some characters in common include *S. oligacanthum* and *S. karsensis* with similar rotate corolla, dryish fruits (much smaller in these cases), dark seeds, close, dense, silvery tomentum and relatively simple, sparsely branched stems. Further removed both geographically and morphologically is *S. tudununggae* which differs in many ways yet has some definite affinities with *S. sturtianum*.

There are some records of *S. sturtianum* being toxic to stock and losses have occurred chiefly in the Broken Hill area of N.S.W. and in the Thargomindah district of Qld. However Everist's (1974) common name for the species of "Thargomindah Nightshade" is a case of the tail wagging the dog. It may be one of the largest of the species found in the drier areas of Australia and exceptional specimens nearly 3 m high by 2 m have been seen both in W.A. and in N.T.

Distribution and habitat (Map 2)

All States except Vic. and Tas. mainly in the arid regions. *S. sturtianum* is commonly found along drainage lines in the drier areas but not on flooded areas with standing water; less common on rocky slopes, it seems to prefer deeper gravelly soils. As can be seen from the distribution map, it is frequently associated with the range systems of arid Australia.

Selected specimens (total seen about 265)

WESTERN AUSTRALIA: Burbidge 148, Aug. 1938, Glenorn Stn (K, PERTH); Chippendale 4543, 20.vi.1958, Giles (AD, CANB, NSW, NT, PERTH); Specht 957a, 14.vii.1958, Mileura (AD, CANB, NSW, PERTH); Symon 5410, 1.vii.1967, 6 km S of Robe River crossing (AD, ADW, B, CANB, PERTH, US).

NORTHERN TERRITORY: Chippendale 568, 23.xi.1954, Tempe Downs Stn (AD, BRI, CANB, NSW, NT); Lazarides 5728, 17.viii.1956, SSE of Alice Springs (AD, CANB, BRI, K, NSW); Byrnes 573, 15.iii.1968, N of Finke River crossing (AD, ADW, DNA, NT).

QUEENSLAND: Maiden s.n., Sept. 1896, Thargomindah (BRI, MPU); Rick & Common 256, 10.xi.1949, Nockatunga (CANB); Carr s.n., 11.xi.1965, Thargomindah-Hungerford Stock route (BRI, K).

NEW SOUTH WALES: Morris 2043, 1.iv.1928, Broken Hill (ADW, BRI); Briggs 2768, 23.v.1969, SW of Broken Hill (ADW, NSW); Symon 6738, 21.vi.1969, N of Broken Hill (ADW, B, CANB, US).

SOUTH AUSTRALIA: Eichler 12680, 17.ix.1956, Gammon Ranges (AD, K, L, UC); Schodde 816, 1.ix.1958, NE of Wirralpa (AD, CAL, CANB, K, L); Symon 6076, 24.viii.1968, Paralana Springs (ADW, B, CANB, NSW, US).

79. *Solanum oligacanthum* F. Muell., Trans. Philos. Soc. Victoria 1 (1885) 18-19.

Type citation: "Another species brought from the interior of this island continent by the same intrepid traveller, might be characterised as follows":-

Holotype: The collection MEL 11991 bears the label "*Solanum oligacanthum* Ferd. Mueller. towards Central Australia, *Capt. Sturt*". Two isotype sheets at BM each bear the label "Central Australia Captain Sturt 1844-6" and no other detail.

Literature

Mueller (1855) 18; Mueller (1856) 167; Bentham (1868) 454; Mueller (1868) 145; Mueller (1882) 96; Tate (1890) 145; Moore (1893) 333; Bailey (1901) 1085 as *S. orbiculatum*; Dixon (1906) 222; Maiden & Betche (1916) 181; Bailey (1913) 354 as *S. orbiculatum*; Black (1917a) 646; Black (1918) 182; Black (1926) 696.



Fig. 86. *Solanum oligacanthum* F. Muell. Drawn from field grown plant at the Waite Institute, from seed from Adelaide Botanic Garden, collected at Cooper's Creek, SA (ADW 32950) $\times \frac{2}{3}$.

An erect clonal herbaceous *perennial* or subshrub 0.5-1 m tall; prickles to 12 mm long, firm, pale, slightly recurved, often pubescent for half their length, present on stems, sometimes paired as pseudostipules, generally absent from petioles, leaves and calyces; all parts pubescent with dense, close, minute, silvery stellate hairs (sessile or shortly multiseriate-stalked, porrect-stellate with short or medium central ray), general aspect grey-green. *Leaves* concolorous, (1-) 1.5 (-3) x (1-) 1.5 (-3) cm broad-ovate, entire, or with broad, shallow, obscure basal lobes, margin undulate, veins prominent below, apex rounded or obtuse, base truncate to cordate; petiole (1-) 2 (-5) mm long. *Inflorescence* a short cyme of 1-6 flowers from an extra-axillary position; peduncle to 1 cm long; floral rhachis c. 5 mm long; pedicel c. 5 mm long. *Calyx* tube c. 3 mm long; lobes 2-3 mm long, triangular, acumens 0.5 mm long, scarcely developed. *Corolla* 2-2.5 cm diam., rotate, short triangular petal tip equal to interacuminal tissue, lavender blue. *Filaments* (Fig. 164) 1 mm long; anthers 5 mm long, oblong, loosely erect. *Ovary* and base of style glandular hairy; style c. 8 mm long, erect; stigma capitate, pale. Fruiting pedicels recurved; calyx slightly enlarged to cover base of fruit; *berry* (Fig. 154) 4-8 mm diam., globular or depressed globular, finally ripening to pale yellow, firm, scarcely succulent. *Seeds* relatively large, 4-5 mm long, black or dark brown, margin slightly thickened and distinct, frequently obscured by a resinous coating, (2) 5 (7) seeds in 12 fruits examined. *Cotyledons* 22-30 x 3.5 mm, long lanceolate, minutely glandular-pubescent, first true leaf ovate-elliptic. (Fig. 86.)

Chromosome number: $n = 12$ Randell & Symon (1976).

Note

Little variability has been evident in this species. It is most closely related to *S. karsensis* from which it differs in its more erect habit, smaller leaves, and exposed fruits. It is less closely related to *S. sturtianum* which has similar flowers and seeds but from which it differs in its smaller lobed leaves, smaller fruits and smaller overall size. *S. oligacanthum* has shown a slight tendency to weediness and several new colonies have been established in southern South Australia at Owen, Kadina and Farrells Flat. It is one of the smallest fruited of the Australian *Solanum*.

Distribution and habitat (Map 9)

South-western Qld, extreme north-western N.S.W. and the north-east of S.A. This species grows in some of the most arid areas of Australia and is found along creek channels, sandy flats that are occasionally flooded, and at the margins of seasonal lagoons.

Selected specimens (total seen about 26)

QUEENSLAND: *Everist & Smith* 82, 15.i.1937, Cuppa Creek W of Durrie (BRI); *Lewis s.n.*, 13.ii.1968, Tambar Stn (CANB); *Crisp* 170, July 1974, Lake Nappaneria (ADW).

NEW SOUTH WALES: *Green s.n.*, Sept. 1965, Fort Grey (NSW).

SOUTH AUSTRALIA: *Hill* 473, 11.xi.1955, Coopers Creek (AD, ADW, E); *Copley* 1117, 9.ii.1967, Kadina Golf Links (AD, ADW, K); *Symon* 5891, 21.viii.1968, N of Tinga Tingana on road to Gidgealpa (ADW, B, CANB, K).

80. *Solanum karsensis* Symon, Trans. & Proc. Roy. Soc. S. Aust. 95 (1971) 230.

Type citation: A. Smith, Dec. 1961. 'Tara Downs' Wentworth, N.S.W.

Holotype: NSW.

A clonal herbaceous *perennial* to 30 cm high; prickles to 1.5 cm long, pale, firm, straight or slightly recurved, pubescent in lower half, scattered and rarely lacking on stems, rare or absent on other parts; all parts pubescent with dense, close, pale stellate hairs, (sessile or shortly multiseriate-stalked, porrect-stellate with short central

ray), general aspect grey-green, slightly discoloured. *Leaves* 1.5-2.5 x 1-1.5 cm, ovate, margin undulate, with up to 5 shallow and weakly developed lobes, lower lobes more often present, leaf and lobe apices rounded, base cuneate to truncate; petiole 3-10 mm long, thickish. *Inflorescence* a few- to 12-flowered cyme from an extra-axillary position; peduncle to 1 (?5) cm long; floral rhachis 1-2 (-4) cm long, (when peduncle is absent the lower flower is adjacent to stem); pedicel 4-5 mm long. *Calyx* tube 3-5 mm long, lobes 2-4 mm long, triangular, lobe tips 1 mm long. *Corolla* 2-3.5 cm diam.; rotate, emarginate very shallowly campanulate, purple. *Filaments* (Fig. 164) 1 mm long, thick;



Fig. 87. *Solanum karsensis* Symon. Drawn from pot grown plant at the Waite Institute, from plant collected at Kars Station, NSW. Fruit from specimen from Albemarle Station, NSW (ADW 44576 and ADW 22208). $\times 2/3$.

anthers 3 mm long, oblong-elliptic, tapering into filament, exceptional in opening by longitudinal slit rather than apical pore. *Ovary* with few glandular hairs towards summit; style 1 cm long, erect, fruiting pedicels 1-1.5 cm long, deflexed; calyx tube 7-10 mm diam., enlarged to cover berry, orifice small, often torn, calyx lobes not much enlarged, 2-3 mm long; *berry* (Fig. 154) about 7 mm diam., globular, colour and texture not known. *Seeds* 4-5 mm long, relatively large, dark, minutely reticulate often obscured by adherent pitch-like gum, few (c. 4) seeds per fruit but not many have been counted. (Fig. 87.)

Chromosome number: $n = 12$ Randell & Symon (1976).

Notes

Little variation is evident in this species. It is most closely related to *S. oligacanthum* from which it differs in its more sprawling habit, larger leaves, more numerous fruits and enlarged calyces. It is the only *Solanum* endemic to NSW. In recent times it has shown signs of being somewhat weedy.

Distribution and habitat (Map 9)

N.S.W., on the western plains. It occurs on depressed areas of heavy soil that are occasionally flooded.

Selected specimens (total seen about 16)

NEW SOUTH WALES: *Beadle s.n.*, Dec. 1942, near Oxley (ADW, NSW); *Pearce* 63, 20.x.1975, between Broken Hill and Menindie (ADW, CANB, K, MO, NSW).

81. *Solanum quadriloculatum* F. Muell., *Fragm.* 2 (1861) 161.

Type citation: "Ad ripas arenosas fluvii (1) Nicholson, sinus Carpentaria Gulf; (2) in montibus Sea Range Terrae Arnhemicae".

Lectotype: Two sheets have been located, one MEL 11735 bears the label "*Solanum quadriloculatum* Gulf of Carp. Nicholson River 21-24 Aug. '56 Dr. M". The second at K has the label "*Solanum quadriloculatum* Ferd. Mueller Gulf of Carpentaria 24 Aug. '56 Dr. M". I propose the collection at MEL as lectotype. The Arnhem Land collection has not been traced.

Solanum ellipticum var. *duribaccalis* J.M. Black, *Trans. & Proc. Roy. Soc. S. Aust.* 52 (1928) 227.

Type citation: no collection was cited at time of publication.

Type material: not traced.

Solanum crassitomentosum Domin, *Biblioth. Bot.* 89 (1929) 1138.

Type citation: "Queensland: Sandsteinhügel der Dividing Range westlich von Pentland (Domin 11. 1910)".

Holotype: PR 530902 and photo ADW. In addition to the label bearing the locality data and the number 8289, a second label is annotated "*Solanum* n. sp. valde affine densevestito sed instructo multo densiore, floribus multo majoribus etc. distinguibilis". I consider it to represent an extreme eastern form of *S. quadriloculatum*.

Literature

Bentham (1868) 464; Mueller (1882) 96; Bailey (1883) 347; Tepper (1893) 20; Bailey (1901) 1091; Haviland (1911) 529; Bailey (1913) 357; Fitzgerald (1918) 102; Ewart & Davies (1917) 243; Gardner (1923) 89; Cleland & Tindale (1959) 138; Chippendale (1960) 39; Everist (1974) 475.

Common name: tomato bush.

An erect or sprawling, sparingly clonal small *shrub* 0.5 m tall; prickles to 5-6 mm long, unequal, pale, straight, abundant on stems, petioles, peduncles and calyces, sparse or absent on upper or lower leaf surfaces; all parts densely pubescent with pale stellate hairs, (sessile or multiseriate-stalked, porrect-stellate with long central ray) some, particularly northern specimens rather scabrous, general aspect grey-green. *Leaves*

variable depending on vigour (4-) 6 (-12) x (2-) 4 (-7) cm, ovate-elliptic, margin entire, slightly undulate, apex acute, base cuneate, truncate to subcordate, oblique; petiole (1-) 2 (-4) cm long. *Inflorescence* an erect or spreading cyme of to 20 flowers from an extra-axillary position; peduncle about 2 cm long; floral rhachis to 8 cm long; pedicel 0.5-1 cm long. *Calyx* tube 2-3 mm long; lobes 2 mm long, triangular; acumens 2-3 mm long, linear. *Corolla* stellate to pentagonal, 2-2.5 cm diam., purple. *Filaments* (Fig. 164) very short; anthers 5 mm long, tapered upwards, loosely erect. *Ovary* glabrous; style c. 1 cm long, erect, slightly curved; stigma small, hooked. Fruiting peduncle and



Fig. 88. *Solanum quadriloculatum* F. Muell. Drawn from pot grown plant at the Waite Institute, from Symon 5278, collected 29 km south-west of Halls Creek, WA (ADW 42433). $\times 2/3$.

pedicels spreading or drooping, bearing 1-10 fruits; calyx to 1 cm long, enlarged to cover base of fruit; *berry* (Fig. 154) 1-1.5 cm diam., globular or depressed globular, at first marbled green, later yellowish-green, finally hard, bony, light yellow-brown. *Seeds* 2 mm long, pale or light mustard yellow to light grey, smooth or minutely rugose towards margin. *Cotyledons* 15 x 5 mm, broad lanceolate, first and second leaves subcordate, entire, later leaves ovate, without prickles. (Fig. 88.)

Chromosome number: $n = 12$ Randell & Symon (1976); in addition Barlow 1137 and 1156, Symon 3071, 3984, 5083, 5265 and 5278 all had $n = 12$.

Notes

This species is usually distinctive especially when in fruit, but inadequate specimens may be confused with vigorous plants of *S. ellipticum*. Numbers of seeds per fruit are variable as the following figures show:- 5 fruits from Symon 5278 had (67-) 83 (-102); 4 fruits from Symon 3984 had (78-) 99 (-145); 6 fruits from Symon 6004 had (70-) 156 (-222); 4 fruits from Barlow 1543 had (145-) 161 (-180).

Specimens from far northern Australia are somewhat more scabrous to the touch than more southerly ones. *S. quadriloculatum* has possibly responded to grazing and disturbance of the pastoral areas of arid Australia and there are some indications that it is spreading. For example there was only one collection from W.A. before 1962 whereas the total is now 16; there are only two early collections from Qld and ten since 1947; the only collection from N.S.W. is a recent one. Its clonal habit, armed woody base, firm, finally bony fruits all combine to enable it to survive grazing. The fruits suggest that the species is related to *S. petrophilum* and *S. eardleyae*, both of which are essentially plants of rocky habitats and both having lobed leaves, which are absent in *S. quadriloculatum*.

Distribution and habitat (Map 6)

Arid Australia, mainly N.T. and S.A., just reaching the north east of W.A. and the north west of Qld and north west N.S.W. It has been collected from many sites but is usually found on loams in undulating country, on levee banks of seasonally dry water-courses, or on broad flood-out plains.

Selected specimens (total seen about 188)

WESTERN AUSTRALIA: Symon 10300, 2.vi.1975, Durach Range, (ADW, PERTH); Symon 5266, 20.vi.1967, Bow River Stn (ADW, B, CANB, K, PERTH); Symon 10926, 2.vi.1975, 26 km E of Tablelands Stn (ADW, PERTH).

NORTHERN TERRITORY: F. Mueller s.n., s.d. Upper Vict. River (K); Chippendale 42, 21.vii.1954, Palm Valley (ADW, CANB, NT); Chippendale 1591, 8.ix.1955, Hale River, Simpson Desert (ADW, CANB, NSW, NT); Symon 5080, 5.vi.1967, W of Borolooloo (ADW, B, CANB, HUJ, K, NSW, NT, US).

QUEENSLAND: Everist 3381, 12.xii.1947, Barkly Downs, 80 km SE of Camooweal (BRI, CANB, K); Symon 4874, 24.v.1967, 17 km S of Chillagoe (ADW, BRI).

NEW SOUTH WALES: Dunlop 1029, 25.viii.1969, 134 km NNE of Bourke (ADW, CBG).

SOUTH AUSTRALIA: Koch s.n., May 1898, Mt Lyndhurst (K); Kuchel 842, 22.viii.1963, 25 km S of Moolawatana Stn (AD, UC); Symon 3984, 3.iii.1966, 6 km E of Wirrealpa Stn (ADW, CANB, K, NSW); Symon 6004, 24.viii.1968, Paralana Springs (ADW, B, CANB, US).

82. *Solanum eardleyae* Symon, sp. nov.

Frutex erectus, 0.5-1 m altus, sparsim ramosus; adspectu generali griseo-viridi concolori; partes omnes pilis stellatis densis pallidis pubescentes. *Aculei* usque 1 cm longi, recti, pallidi vel fuscati, inaequales, in caulibus et in pedunculis et in calycibus copiosi, in utraque pagina foliorum et in vena media corollae plerumque obvii. *Folia* (4-) 6 (-10) x (2-) 3 (-4) cm, oblonge ovata, margine undulata, lobis quinque vel pluribus brevibus male definitis obtuse triangularibus, sinibus latis et brevibus, apice folii et loborum rotundato vel acuto, basi cuneata vel truncata; petiolus 1-2 cm pro ratione brevis et crassus. *Inflorescentiae* numerosae, plerumque erectae cymae, 1-12 flores, in parte supera caulis extra-axillares; pedunculus 1-2 cm; rachis floralis 3-10 cm; pedicellus 5-10 mm; tubus calycis c. 3 mm, lobis angustis in acumen lineare contractis,

in toto 5-10 mm; nervus medius conspicuus; corolla 3-3.5 cm diam., rotata, emarginata, purpurea; filamenta 2 mm; antherae 5 mm, oblongae; ovarium apice paucis pilis glandulosis praeditum; stylus c. 1 cm, declinatus. Pedicellus fructifer reflexus, tubus calycis auctus fructum tegens, lobis elongatis fructum includentibus sed haud celantibus; pedicellus et calyx spinosissimi. Bacca 1-1.5 cm diam., globosa, matura flavida, denuum pallida, dura et ossea.

Typus: P.K. Latz 939, 1.x.1970, Duffield Rocks about 91 km NE of Mt Davies Camp, approx. 25°36'S, 129°44'E. "Erect subshrub to 90 cm, calyx hugging globular fruit, locally common in litter zone of *Eucalyptus terminalis* near hill (also on hill)". NT (Holotypus), ADW, CANB, MEL. (Fig. 83.)



Fig. 89. *Solanum eardleyae* Symon. Drawn from herbarium specimen, ADW 33309, collected by *Beaglehole* 22779, 86 km west of Victory Downs homestead, west of Kulgera, on the NT-SA border. $\times \frac{2}{3}$.

An erect straggly *shrub* 0.5-2 m tall, sparsely branched; prickles to 1 cm long, straight, pale or dark-tinted, unequal, abundant on stems, peduncles and calyces, generally present on upper and lower leaf surfaces and main vein of corolla lobes; all parts with dense tomentum of stellate hairs (sessile or multiseriate-stalked, porrect-stellate with short or medium central cell) general aspect usually rusty-green, less often grey-green, concolorous. *Leaves* (4-) 6 (-10) x (2-) 3 (-4) cm, oblong-ovate, margin undulate, with 5 or more shallow, weakly developed, bluntly rounded lobes, sinuses broad and shallow, leaf and lobe apex rounded or acute, base cuneate to truncate; petiole 1-2 cm long, relatively short and thick. *Inflorescences* numerous, usually erect cymes, with few to 12 flowers, from extra-axillary positions on upper part of stems; peduncle 1-2 cm long, floral rhachis 3-10 cm long; pedicel 5-10 mm long. *Calyx* tube c. 3 mm long; lobes narrow, tapering into linear acumen, together 5-10 mm long, midvein conspicuous. *Corolla* 2.5-3.5 cm diam.; rotate, emarginate, purple. *Filaments* (Fig. 164) 2 mm long; anthers 5 mm long, oblong-lanceolate, relatively stout. *Ovary* with few glandular hairs at summit; style c. 1 cm long, curved, tinged purple. Fruiting pedicels reflexed; calyx tube enlarged, lobes elongated and enclosing fruit readily visible between them, all prickly; *berry* (Fig. 154) 1-1.5 cm diam., globular, yellowish when ripe, finally hard, pale, bony. *Seeds* 1.5-2 mm long, lenticular, light buff to light grey-brown, (65-) 184(-281) in 12 fruits counted. (Fig. 89.)

Chromosome number: unknown.

Notes

This species is most closely related to *S. petrophilum* F. Muell. from which it differs in its taller more erect habit, larger, broader leaves and more numerous flowers per cyme. Variation occurs in the lobing of the leaves, those of the vigorous young growth being almost entire and rather similar to *S. quadriloculatum*. The restricted distribution suggests that *S. eardleyae* is a relic.

This species is named after Miss C.M. Eardley, mentor of botany students in S.A. for a generation, for her contributions to botany and for her enthusiasm for, and encouragement of, taxonomy.

Distribution and habitat (Map 9)

Central Australian Range systems mainly south of the MacDonnell Ranges i.e. Musgrave Ranges, Everard Ranges and Mt Connor. The species has been collected mainly from the base of these rocky masses.

Selected specimens (total seen about 30)

NORTHERN TERRITORY: *Beaglehole* 22854, 28.vi.1967, SE side of Mt Connor (acb, ADW, CANB); *Latz* 5044, 28.iv.1974, Mulga Park Homestead (ADW, DNA, NT); *Latz* 5058, 29.iv.1974, Mt Frazer, north Musgrave Range (ADW, NT).

SOUTH AUSTRALIA: *Hill & Lothian* 707, 31.vi.1958, between Ernabella and Mt Woodroffe (AD, BM, G, P); *Cleland s.n.*, 16.vi.1958, Ernabella (AD).

83. *Solanum petrophilum* F. Muell., *Linnaea* 25 (1852) 432-434.

Type citation: "In collium rupibus et glarea fluviorum exarescentium prope Cudnaka". Cudnaka is in the Flinders Ranges, South Australia.

Holotype: At MEL are two sheets bearing the labels MEL 12106 "*Solanum petrophilum* Ferd. Mueller Auf felsigen bergen bei Cudnaka Oct '51". and MEL 12107 with two labels "*Solanum petrophilum* Ferd. Mueller Lake Torrens" and "*Solanum petrophilum* Ferd. Mueller. Foliis pinnatis suffrutex diffusis. Corolla violacea 1-1½" diametro. In rupibus & rivis exsiccatis prope Cudnaka stylus . . . Oct '51 Dr. M". All the material is consistent with a single collection and the second sheet MEL 12107 which is the better specimen should perhaps be nominated holotype.

Literature

Bentham (1868) 461; Mueller (1868) 146; Mueller (1882) 96; Moore (1893) 334; Mueller & Tate (1896) 373; Tate (1890) 145; Dixon (1906) 223; Turner (1912) 283; Black (1915) 835; Maiden & Betche (1916) 181; Black (1918) 182; Black (1926) 499; Hurst (1942) 373; Webb (1948) 159; Everist (1974) 474.



Fig. 90. *Solanum petrophilum* F. Muell. Drawn from field grown plant at the Waite Institute, from root from Parachilna Gorge, Flinders Ranges, SA (ADW 32948). $\times \frac{2}{3}$.

Common name: rock nightshade

An intricate, small, clonal *shrub* 20-50 cm tall, sometimes sprawling; prickles to 1 cm long, unequal, usually straight, rarely curved, sometimes reddish, conspicuous on stem, petiole, upper and lower leaf surfaces, peduncle, pedicel and calyx; all parts with close, dense tomentum of stellate hairs, (sessile or multiseriate-stalked, porrect-stellate or multangulate with medium to long central ray); general aspect grey-green, slightly discolourous. *Leaves* (1-) 3-4 (-7) x 1.5-2 cm, ovate-lanceolate to oblong, markedly lobed and undulate with 3-6 lobes on each side, lobes shallow and rounded or cut half way to midvein, sinuses rounded, leaf and lobe apex rounded or acute, base truncate to cordate; petiole 5-15 mm long. *Inflorescence* a 3-10-flowered cyme from an extra-axillary or leaf-opposed position, peduncle 5-10 mm long; flowering rhachis to 5 cm long; pedicel 5-10 mm long. *Calyx* tube c. 3 mm long; lobes 2 mm long, short-triangular, ending in linear acumens 5 mm long. *Corolla* 2.5-3 cm diam., rotate, shallowly campanulate, showy purple. *Filaments* (Fig. 164) short; anthers 4-5 mm long, oblong, loosely erect. *Ovary* with few glandular hairs towards summit; style to 8 mm long, pedicel firm; almost hooked at tip, mauve; stigma capitate, pale. *Fruiting* peduncle and pedicel firm; pedicel deflexed; calyx appressed, lobes 8-12 mm long, linear, elongated to enclose fruit, prickly inter-sinus tissue developed in basal $\frac{1}{4}$ to $\frac{1}{3}$ only, the berry visible between the narrow lobes, *berry* (Fig. 154) 8-10 mm diam., globular or depressed globular, at first marbled green, later yellow, finally hard, dry, bony, pale or light brown, often remaining on bush for some time. *Seeds* to 1.5 mm long, compressed, light brown or grey-brown, seed numbers variable, (15-) 22 (-39) in thirteen fruits, 208 in a single fruit. *Cotyledons* narrow lanceolate, c. 10 x 2 mm, petiole 3-4 mm long, first leaf about 15 x 10 mm, broad elliptic, entire. (Figs 90 and 91.)

Chromosome number: $n = 12$ and $n = 24$ Randell & Symon (1976); in addition Howard s.n., coll. Widgiemooltha, Randell 029, Symon 1128, 5494 and 8014 have been counted as $n = 12$.

Notes

S. petrophilum is a widely spread species with populations substantially separated in the Gawler Ranges, Flinders Ranges extending to Broken Hill and in the central Australian Ranges. In all of these areas a degree of speciation has occurred. Subtle differences which are difficult to describe separate the Gawler and Flinders Ranges populations, most evident in the coarser, darker prickles of the Gawler Ranges plants. More variation occurs in the central Australian plants and those from the more south-westerly ranges and extending into Western Australia; they have less deeply lobed leaves, grey pubescence, a sprawling habit, and perhaps deserve subspecific status. Those from the isolated group in southern W.A., in the eastern Goldfields, are similar to those in southern S.A.

S. petrophilum is most closely related to *S. eardleyae* from which it differs in its smaller stature, more deeply lobed leaves, and fewer flowers. It shares little with *S. quadriloculatum* except the bony pale fruit.

Distribution and habitat (Map 5)

W.A., in the eastern Goldfields (rare) and in the central Australian Ranges; N.T. in the central range systems; S.A. in the Gawler and Flinders Ranges, and the central ranges in the far north; N.S.W. near Broken Hill in the most easterly parts of the Olary spur of the Flinders Ranges. It has almost invariably been collected from rocky sites or close to the base of ranges.

Selected specimens (total seen about 250)

WESTERN AUSTRALIA: (1) Southern: Aplin 1793, 7.ix.1962, Fraser Range Stn (PERTH); George 5952, 9.xi.1963, 51 km E of Karonie (PERTH); (2) Central Ranges: Hill & Lothian 923, 11.vii.1958, 5 km W of Blackstone mining camp (AD, NT); George 4773, 7.vii.1963, NW end of the Cavanagh Range (ADW, PERTH).

NORTHERN TERRITORY: (1) typical form: *Chippendale s.n.*, 10.vii.1957, 16 km NE of Marshall Bore, Marshall River (ADW, BRI, NT); *Chippendale s.n.*, 5.viii.1954, 11 km S of Kulgera (AD, CANB, NSW, NT); (2) Grey form: *Chippendale s.n.*, 23.vii.1957, Gorge near Mt. Liebig (AD, ADW, NT); *Chippendale s.n.*, 24.vi.1958, Lasseters Cave, Hull River (AD, ADW, NSW, NT).

NEW SOUTH WALES: *Morris 697*, 4.ix.1921, Mt Robe (ADW, BRI, NSW); *Briggs 2762*, 23.v.1969, Rowena Stn, 8 km SW of Mootwingie (ADW, NSW).

SOUTH AUSTRALIA: (1) For north typical form: *Whibley 932*, 5.ix.1963, Mt Harriet (AD); *Symon 3324*, 22.ii.1965, 24 km E of Everard Park Homestead (ADW, BIRM, CANB, DAV, HUJ, K); (2) Far north grey form: *Symon 3351*, 6.viii.1962, Mt Lindsay (ADW, K); *Beaglehole 10182*, 25.vi.1965, Ronald Well, Everard Park (acb, AD, CANB); (3) Flinders Ranges: *Symon 3986*, 3.iii.1966, 6 km W of Blinman (ADW, CANB, K,



Fig. 91. *Solanum petrophilum* F. Muell. Drawn from field grown plant at the Waite Institute, from seed from *Symon 2551*, collected from Mt Lindsay, far north-west of SA (ADW 36717). $\times 2/3$.

NSW); Symon 4067, 28.ix.1966, between Hesso & Yudnapinna Stn (AAU, ADW, BIRM, CANB, NSW); Saddler s.n., 17.viii.1967, Paralana Springs (ADW, B, US); (4) Eyre Peninsula: Rohrlach 515, 7.ix.1959, Refuge Rocks 35 km E of Kimba (AD, BM, G, IA, K, L, P); Symon 3444, 22.ii.1965, 16 km NW of Moonaree Stn (AAU, ADW, CANB, IND, K).

84. *Solanum lachnophyllum* Symon, Trans. & Proc. Roy. Soc. S. Aust. 95 (1971) 231.

Type citation: C.A. Gardner 7871, 16.x.1945, stony hillside 58 km east of Meekatharra, Western Australia. "Dense, widely branched shrub 30-60 cm high, leaves thick, soft, hairy-tomentose, flowers violet".

Holotype: PERTH.

A dense spreading shrub to 1 m high, stems to 2.5 cm diam., with corky fissures under dense tomentum; prickles to 1 cm long, unequal, fine, straight, pale, abundant on stems, fewer on petioles, leaves, peduncles, pedicel and calyx; all parts densely woolly-pubescent with pale stellate hairs (short to very long multiseriate-stalked, porrect-stellate with



Fig. 92. *Solanum lachnophyllum* Symon. Drawn from holotype (PERTH), collected by Gardner 7871, 58 km east of Meekatharra, WA. $\times 2/3$.

short glandular or long non-glandular central cell) also short or long, simple, glandular hairs more readily seen within the calyx lobes. Juvenile leaves to 32 x 11 cm, adult leaves 5-8 x 2-3 cm, ovate-lanceolate, entire, base cuneate to rounded, apex acute, sweetly scented when fresh, general aspect grey-white, concolorous. *Inflorescence* a cyme of 2-3 flowers; peduncle 1-1.5 cm long; pedicel 5-10 mm long. *Calyx* tube 7 mm long, campanulate; lobes c. 5-10 mm long, unequal triangular. *Corolla* 3-3.5 cm diam., broadly stellate to rotate, shallowly campanulate with distinct tube to 5 mm long before flaring of limb, acumens 1 mm long, equalled by interacuminal membranes. *Filaments* (Fig. 160) short; anthers 7-8 mm long, lanceolate, loosely erect. *Ovary* with glandular hairs above; style 1.5 cm long, glandular hairy in lower half, bent at tip; stigma small, terminal. Fruiting pedicels deflexed; calyx tube to 2 cm long, enlarged to enclose berry; *berry* (Fig. 154) 1.5-2 cm long, ovoid to ovoid-conical, green at maturity, finally drying brown and hard. *Seeds* 2.5-3 mm long, suborbicular, flattened, pale. *Cotyledons* lanceolate, 15 x 6 mm, petiole 6 mm long, first leaf elliptic 2.5 x 2 cm, second leaf with prickles on petiole, third leaf with prickles on blade. (Fig. 92.)

Chromosome number: $n = 12$ Randell & Symon (1976) and, in addition, Randell has counted $n = 12$ for *Symon 10007*.

Note

There is little variation in the specimens available for study except for leaf size related to age and vigour. *S. lachnophyllum* is most closely related to *S. ashbyae*, *S. lasiophyllum* and *S. gabrielae*. It differs from all three in its more consistently ovate-lanceolate leaves and distinct, thick-felted tomentum, from *S. gabrielae* and *S. lasiophyllum* in having ovate rather globular fruit, and from *S. ashbyae* and *S. gabrielae* in lacking abundant glandular hairs and in its whitish rather than green or yellow-green aspect. A well grown plant of *S. lachnophyllum* is one of the most striking and attractive of the Australian solanums with its pale blanket-like tomentum and dense shrubby habit. Despite its beauty it has been rarely collected until recent times.

Distribution and habitat (Map 4)

W.A. between Wiluna and Meekatharra to about 120 km N of Meekatharra. It appears to be substantially confined to stony hillsides.

Selected specimens (total seen about 15)

WESTERN AUSTRALIA: *Brockway s.n.*, 17.x.1947, 48 km E of Meekatharra (CANB, PERTH); *Symon 9971*, 13.v.1975, 19 km W of Wiluna (ADW, B, CANB, K, L, MO, US, PERTH).

85. ***Solanum lasiophyllum*** Dunal in Poir., Encyc. Meth. Bot. Suppl. 3 (1814) 764; non Humb. and Bonpl. ex Dunal, Solan. syn. (1816) 25.

Type citation: "Cette espèce a été apportée de la Nouvelle Hollande (Dun. in herb. Mus. Paris)".

Type material: At P there are at least four sheets bearing an array of labels (1) "Herb. Richard *Solanum lasiophyllum* Dun. Nlle. Holl. Cote occid. 1822"; (2) "*Solanum lasiophyllum* C. Gaudichaud N. Holl. Baie de Chn Marin" and "(*Asterotrichum* Dnl. oliganthes) *S. eriophyllum* Dun prodr No. 705.1—*lasiophyllum* Poir."; (3) "*Solanum lasiophyllum* Dunal Scripts Prodr. No. 705" and "*Solanum eriophyllum* Dnls in Prodr.—*lasiophyllum* Poir. Nouv. hollande isle sterile"; (4) "*Solanum lasiophyllum* Dunal Voyage du capitaine Baudin 1801 Nouv. Hollande Isles steriles". The material is consistent with a single collection and I would nominate number two above as lectotype because of the precision of its labelling. An isotype of the collection is at K.

Solanum eriophyllum Dunal, Solan. syn. (1816) 30, No. 179.

Type citation: This was based on the species above.

Solanum lasiophyllum Dunal var. *crassissimum* Benth., Fl. Austral. 4 (1868) 463.

Type citation: Northern Australia, North West Coast, *Bynoe*.

Holotype: K.

Solanum crassissimum (Benth.) Domin, Biblioth. Bot. 89 (1929) 1140.

Solanum inceanum Domin, Vestn. Kral. Ceske Spolecn. Nauk, Tr. Mat. - Prir. 22 (1923) 107.

Type citation: "Western Australia, collected *W.H. Ince*".

Holotype: PR 530926. This bears two labels: "*Solanum* n. sp. aff. *echinatum* flores (et calyx) conspicue majores folia brevem petiololo *W.H. Ince*" and "*K. Domin, Iter Australiense a. 1909-1910 Nro. 8313 Solanum Inceanum* Domin n. sp. West Australia *W.H. Ince*". There is an isotype at K.



Fig. 93. *Solanum lasiophyllum* Dunal. Drawn from field grown plant at the Waite Institute, from seed from Kings Park and Botanic Garden, collected in WA (ADW 40992). $\times 2/3$.

Literature

Poiret (1814) 764; Dunal (1816) 30 as *eriophyllum*; Don (1837) 426 as *eriophyllum*; Walpers (1844) 71 as *eriophyllum*; Dunal in DC. (1852) 300 as *eriophyllum*; Mueller (1868) 145 as *eriophyllum*; Bentham (1868) 463; Mueller (1882) 96; Mueller & Tate (1896) 373; Schumann (1898) 148; Schumann & Lauterback (1901) 532; Ewart & Davies (1917) 243; Domin (1929) 1140; Chippendale (1963) 9; Grieve & Blackall (1975) 602; Davies (1976) 665.

Common name: flannel bush

An erect or rounded *shrub* 0.2-1 (-2) m tall, sparingly clonal; stems lasting several years, becoming woody, sometimes darkening at base and becoming almost black with age; prickles to 5 mm long, pale, fine, straight, generally present on stems, abundant on fruiting calyx, less common on petioles, peduncles and pedicels, rare or absent on leaves; all parts densely and closely pubescent with pale stellate hairs, (short or long multiseriate-stalked, porrect-stellate with long central cell) looser and almost floccose on fruiting calyx, growing points and buds often suffused purple, general aspect grey-green, leaves concolorous. *Leaves* variable in size, (2.5) 5 (-8) x (1.5-) 4.5 (-7) cm, ovate to broad elliptic, entire or very rarely with shallowly lobed margin, apex rounded, base truncate or rounded; petiole 0.5-1.5 cm long, relatively thick. *Inflorescence* a short cyme of 2-6 flowers from an extra-axillary position; peduncle c. 1 cm long, pedicel 1 cm long. *Calyx* tube 5-7 mm long; lobes 3-5 mm long, bluntly triangular, acumens not developed. *Corolla* 2.5-3 cm diam., rotate-pentagonal, purple, showy. *Filaments* (Fig. 160) 1-2 mm long; anthers 4-5 mm long, oblong, tapering, firmly erect in cone. *Ovary* glabrous; style 10-12 mm long, erect, slightly sigmoid; stigma pale, terminal on recurved tip of style. Fruiting peduncle and axis (1-) 2-3 (-6) cm long; pedicels c. 1 cm long, recurved, calyx 1-1.5 cm diam., accrescent, globular to ovate, enclosing fruit, densely pubescent and prickly; calyx lobes not greatly enlarged nor prickly; orifice small; *berry* (Fig. 154) 10-13 mm diam., globular or distinctly ovoid, yellowish at maturity, finally drying hard and woody. *Seeds* 2-3 mm long, pale or light brown, scarcely reticulate. *Cotyledons* c. 18 x 5 mm, lanceolate, glandular-ciliate, first true leaf 12 x 7 mm, ovate elliptic, glandular hairy. (Fig. 93.)

Chromosome number: $n = 12$ and $n = 24$ Randell & Symon (1976). The collections Symon 4705, 5362, 10096 have been counted as $n = 12$ and Symon 2500 and cultivated specimen ADW 34099 have given counts of $n = 24$.

Notes

Variation occurs in leaf size due to vigor and phase of growth, slightly lobed leaves may occur, and occasionally the berries may be elliptic rather than globular. The material from the Rawlinson Ranges tends to have rather stout stems, often almost black below: that from Port Hedland area tends to have more heavily armed calyces and longer pedicels, the plants also being more spreading. The species is related to *S. lachnophyllum* from which it differs in vestiture, leaf shape and fruit shape; it differs from *S. gabrielae* in leaf shape, tomentum and corolla form, and from *S. ashbyae* which is generally larger, has broader, greener leaves, more glandular tomentum and different fruits.

Despite the references by Schumann above, the species is not known to occur outside Australia.

Distribution and habitat (Map 8)

W.A., the south west of N.T. and the north west of S.A. It is the most widespread species in W.A. and occurs on sandy soils and on stony rises. In N.T. and S.A. it tends to be more restricted to rocky outcrops or ranges.

Selected specimens (total seen about 250)

WESTERN AUSTRALIA: *Gaudichaud s.n.*, 1818, Baie de Chiens Marins (BM, G, P); *Morrison s.n.*, 3.x.1905, between Uaroo and Nanutarra (E, K, NSW, PERTH); *Symon* 2297, 2.viii.1962, E end of Schwerin Mural Crescent (AD, ADW, CANB, K, PERTH); *Symon* 5453, 4.vii.1967, Pindar (ADW, B, CANB, K, PERTH, US).

NORTHERN TERRITORY: *Chippendale* 4619, 24.vi.1958, Lasseters Cave, Hull River (ADW, NSW, NT); *Maconochie* 659, 18.i.1969, Churnside Area, W of Ayers Rock (ADW, NT).

SOUTH AUSTRALIA: *Cleland s.n.*, 24.viii.1954, near Mt Davies (AD); *Symon* 3387, 19.ii.1965, Mt Christie, N of Wynbring Rocks (ADW, CANB, BIRM, IND, K).

86. *Solanum gilesii* Symon, Trans. & Proc. Roy. Soc. S. Aust. 95 (1971) 229.

Type citation: *A.S. George* 9014, 27.vii.1967, about 11 km west of Dover Hills, northern Gibsons Desert, Western Australia. Spreading shrub 30-40 cm, flowers pale purple. Approximate Lat. 23°05'S, Long. 128°35'E.

Holotype: PERTH.



Fig. 94. *Solanum gilesii* Symon. Drawn from herbarium specimen, *George* 9014, from Dover Hill, WA (ADW 33379). Fruit from *Latz* 692, 66 km south-west of The Granites, NT (NT 27700). $\times \frac{2}{3}$.

A small clonal *shrub* to 0.5 m tall, spreading or erect; prickles to 5 mm long, straight, fine, orange-brown, scattered on stems, few on petiole, absent from leaves, abundant and conspicuous on calyx; all parts densely and closely pubescent with stellate hairs (short or long multiseriate-stalked, porrect-stellate with long central cell) strikingly orange-brown on younger growing points, stems and calyces; leaves brownish-green above, paler below, distinctly discolorous; general aspect brightly ferruginous golden-brown on young parts. *Leaves* 2-4 x 1-3 cm, ovate to oblong-ovate, with up to 8 broad shallow lobes, sinuses shallow and rounded, leaf apex rounded or acute, margin undulate-repand; leaf base truncate to broadly cuneate, equal or unequal. *Inflorescence* a short cyme of 1-2 flowers; peduncle to 5 mm long, ferruginous floccose-pubescent; pedicel 5-7 mm long. *Calyx* tube c. 5 mm long; lobes 1-3 mm long, broadly triangular. *Corolla* 2.5 cm diam., pentagonal, interacuminal tissue not exceeding petal tip. *Filaments* (Fig. 160) 2-3 mm long, slender; anthers 7-8 mm long, distinctly tapered apically, loosely erect. *Ovary* glabrous; style 10-15 mm long, erect, sparsely stellate-pubescent below, slightly sigmoid; stigma terminal, capitate, slightly bilobed. Fruiting pedicels deflexed, 1-1.5 cm long; calyx tube 1-1.5 cm diam., enlarged to cover fruit, conspicuously prickly, lobes about 3-5 mm long, triangular, unarmed, finally the whole splitting into 3-5 irregular lobes which are raised to expose berry; *berry* (Fig. 154) c. 1 cm diam., globular, at first green, finally drab bone-coloured. *Seeds* 3 mm long, pale, 55, 37, 36, 17 in four fruits (*Latz* 4035). (Fig. 94.)

Chromosome number: unknown.

Note

This species is distinct with its attractive orange-brown growing tips. It is perhaps most closely related to *S. lasiophyllum* from which it differs in its smaller, more lobed leaves, intense rusty rather than grey tomentum, calyx prickly in bud, smaller flowers and reduced inflorescences. The great geographical gap between the first and later gathering reflects the inadequacy of collections in the sandy deserts of north-eastern W.A.

Distribution and habitat (Map 4)

W.A. and N.T. widely scattered in the deserts south, west and north of Giles. It has been collected on the sandy plains and sand dunes.

Selected specimens (total seen about 15)

WESTERN AUSTRALIA: *George* 8909, 25.vii.1967, northeast of Sir Frederick Range (ADW, PERTH); *Latz* 4035, 20.vi.1973, 61 km S of Sturt Creek Homestead (AD, ADW, CANB, DNA, PERTH).

NORTHERN TERRITORY: *Latz* 726, 1.viii.1970, 43 km SW of The Granites (NT, PERTH); *Gittens* 2444, July 1972, Inningarra Range, Mongrel Range (ADW, NSW).

87. *Solanum ashbyae* Symon, sp. nov.

Suffrutex 1 x 2 m altus. Caulis usque 5 cm diam. fuscus cortice suberosa. *Aculei* usque 5 mm longi, tenues, recti, pallidi aut fulvi, densi in caulibus, sparsi alibi. Omnes partes pilis stellatis viscosis confertim pubescentes; rami juniores et folia flavovirentes tomentosi. *Folia* 5-8 x 4-5.5 cm, ovata vel elliptica, integra; petiolus 2-4 cm longus; adspectu generali flavovirenti. *Inflorescentia* cymosa floribus hermaphroditis infra et floribus masculis supra (usque 12 flores). Flos hermaphroditus: pedicellus 1.5 cm longus; tubus calycis circa 3 mm longus; lobi calycis 5-10 mm longi, inaequales, lanceolati; *corolla* 2.5-4 cm diam. late stellata usque rotata; filamenta 1-2 mm longa; antherae 7-8 mm longae, late lanceolatae, erectae conum facientes; ovarium 2 mm longum glabrum; stylus 12 mm longus minime sigmoideus; stigma parvum obliquum. Flos masculinus 3 cm diam. forma floris hermaphroditi similis; antherae 5-7 mm longae, erectae; ovarium et stylus vestigialis. Pedicellus fructifer plus minusve elongatus et tenuis, baccis infra folia; calyx 15-18 mm longus, membranaceus laxe adpressus, auctus, $\frac{3}{4}$ fructus tegens. *Bacca* 1-1.5 x 1.5 cm elliptica vel globosa, primo pallide viridis; postea indurescens et brunnea. Semina 2 mm longa, biconvexa, suborbiculata, bruneola.



Fig. 95. Holotype of *Solanum ashbyae* Symon (Symon 9983, ADW).



Fig. 96. Holotype of *Solanum cookii* Symon (Symon s.n., ADW).

Holotypus: PERTH. Isotypi: ADW, CANB, K. D.E. Symon 9983, 15.v.1975, Western Australia, 120 km north of Meekatharra, $\pm 25^{\circ}45'$, $119^{\circ}00'$. "Round topped bush to 1 m high x 2 m wide, main stem to 5 cm diam., dark corky fissures develop, apparently not clonal. Very sticky plant, leaves faintly scented (much less than *S. lachnophyllum*). Racemes of few flowers, corolla broadly stellate, males above, hermaphrodite below. Ripe fruits pale bright green, hang below on slender peduncle and pedicel, three quarters covered by appressed, membranous, sparsely prickly calyx". (Fig. 95.)

A shrub to 1 x 2 m, apparently not clonal; main stem may reach 5 cm diam., dark, with corky bark emerging between fissures of tomentum and prickles; prickles to 5 mm long, fine, straight, pale or yellowish, abundant on stems, sparse on petioles, leaves, peduncles, pedicels and calyx; all parts densely pubescent with viscid gland-tipped stellate hairs (short or long multiseriate-stalked, porrect-stellate with long gland-tipped central cell), stems and young leaves appearing yellowish tomentose and mature leaves greener. Leaves 5-8 x 4-5.5 cm, ovate-elliptic; base rounded, oblique; apex rounded to acute; margin entire; petiole 2-4 cm long, general aspect yellowish-green. Inflorescence a cyme of to 12 flowers, several lower ones hermaphrodite, upper male, peduncle 3-4 cm long, floral rhachis 2-3 cm long. Hermaphrodite flowers: pedicel to 1.5 cm long. Calyx tube c. 3 mm long, with few prickles; lobes 5-10 mm long, unequal, lanceolate. Corolla 2.5-4 cm diam., broadly stellate to rotate, lobes rounded, inter-acuminal tissues scarcely exceeding lobe apex, acumens 1-2 mm long, distinct. Filaments (Fig. 160) 1-2 mm long; anthers 7-8 mm long, broadly lanceolate, erect in cone. Ovary 2 mm long, glabrous; style to 12 mm long, slightly sigmoid, apex curved; stigma small, terminal, oblique. Male flowers 3 cm diam. or less, similar in shape. Anthers 5-7 mm long, erect. Ovary, style and stigma vestigial. Fruiting peduncle and pedicel slender, fruits hanging below leaves; peduncle 3 cm long; pedicel 2 cm long; calyx 15-18 mm long, membranous, loosely appressed, enlarged to cover $\frac{3}{4}$ of berry, lobes then 1 cm long, triangular; berry (Fig. 154) 1-1.5 x 1.5 cm, ovoid to globular, occasionally slightly conical, pale, bright green when mature, finally drying hard and brown. Seeds 2 mm long, biconvex, suborbicular, light brown. Cotyledons 12 x 4 mm, lanceolate, petiole 3 mm long, first leaf to 2 x 2 cm, broad ovate, second leaf elliptic, third leaf elliptic with prickles on petiole. (Fig. 97.).

Chromosome number: $n = 12$ counted by B. Randell (unpublished) from Symon 9982 and 9983.

Note

S. ashbyae is most closely related to *S. lachnophyllum*, *S. gabrielae* and to a lesser extent to *S. lasiophyllum*. Its viscid pubescence is shared with *S. gabrielae* and its oval to rarely conical berry with *S. lachnophyllum*. From *S. gabrielae* it differs in having more abundant prickles on the stem and few prickles on the calyx. In addition the calyx of *S. ashbyae* is more membranous. From all of these taxa it differs in its well developed andromonoecism and the slender fruiting peduncle and pedicel. Its relatively large woody habit, simple leaves and restricted distribution suggest that it may be somewhat relic as also applies to *S. lachnophyllum*. The species is named after Miss A.M. Ashby for her generous contribution to the illustration of Australian plants.

Distribution and habitat (Map 9)

W.A., in the Austin district of the Ereman province. In open woodlands at the margin of granite slopes and on deep red sandy soils.

Specimens examined

WESTERN AUSTRALIA: Gardner 12687a, 28.viii.1960, near the River Murchison (PERTH); Davies s.n., 15.xi.1960, Ejah, Mileura, Cue, hill foot slope, granite soils shrub 3' (CANB); Royce 6479, 16.viii.1961, Henry River, Barlee Range, dense woody shrub in red sandy soil (PERTH); Wilson 7426, 28.vii.1968, Von Treuer S of Lake Carnegie, plant 60 cm, leaves glutinous (PERTH); Kruiskamp s.n., 21.ix.1968, at the base of the Ejah

breakway, boundary between Mileura and Nookawarra Stn (ADW); *Saffrey* 807, 4.vii.1969, Wilgie Mia Ochre Mine, NW of Cue, bush 30 cm, in ochre soil (PERTH); *Beard* 6043, 18.vii.1970, Mooloo Downs, 16 km N of Mt Dalgety (NSW, PERTH); *Saffrey* 1119, 30.viii.1970, near Ejah breakaway, Mileura Stn, shrub 1 m rocky outcrop (PERTH); *Burbidge & Kanis* 8068, 21.vii.1973, Ejah, Mileura Stn, Upper Murchison, shrub to 4', common between rocks at margin of granite mesa, flowers violet-purple, fruit persistent, plants grazed by goats (CANB); *Ashby* 5059, 1974, Weiragoo Range on Noobawarra Stn (AD, ADW); *Symon* 9982, 15.v.1975, 120 km N of Meekatharra, 63 km N of Karalundi Mission, deep red soil in mixed woodland (ADW, CANB, K, MO, PERTH); *Symon* 9987, 15.v.1975, as above (ADW); *Symon* 9991, 15.v.1975, 22 km S of Gascoyne River South, shrubs to 1.5 m in open woodland (ADW); *Symon* 10005, 15.v.1975, N of Kumarina on low stony rises (ADW, PERTH).



Fig. 97. *Solanum ashbyae* Symon. Drawn from pot grown plant, from seed from *Symon* 9991, from near the Gascoyne River, south branch, WA (ADW 46950). Fruit from original collection (ADW 46949). $\times \frac{2}{3}$.

88. *Solanum gabrielae* Domin, Biblioth. Bot. 89 (1929) 1142.

Type citation: "Nordwest-Australien: zwischen Ashburton und De Gray River, E. Clement".

Holotype: PR 530923. This is the material illustrated by Domin fig. 189. Isotypes: K, two sheets.



Fig. 98. *Solanum gabrielae* Domin. Drawn from pot grown plant at the Waite Institute, from seed from Symon 5401, collected 22 km south-east of Tambrey Stn on road from Wittenoom, WA (ADW 40493). $\times \frac{2}{3}$.

A spreading low *shrub* to 30 x 50 cm, not known to be clonal, prickles to 5 mm long, fine, straight, pale, common on stems and calyces, rare or absent elsewhere; all parts densely pubescent with stellate hairs (medium to very long multiseriate-stalked, porrect-stellate with very long central ray which frequently has a glandular tip) general aspect sericeous, glandular, yellowish-green, leaves concolorous. *Leaves* (3-) 5 (-7) x 2.5-4.5 cm, ovate to ovate-lanceolate, entire, apex acute, base rounded to subcordate, equal or oblique, veins distinct below; petiole 1-2 (3) cm long, relatively thick. *Inflorescence* a 2-6-flowered cyme; peduncle 1-2 cm long; pedicels short. *Calyx* tube 5-7 mm long; lobes 2-3 mm long, bluntly triangular, all densely pubescent. *Corolla* 2-3 cm diam., rotate, margin incurved 2-4 mm in cultivated specimen, lilac-purple with a greenish 'star', corolla tube firm, cylindrical for 3-4 mm. *Filaments* (Fig. 160) short; anthers 4-5 mm long, tapering, closely erect. *Ovary* glabrous; style 2 cm long, pale, erect, exceeding anthers by 3 mm; stigma green, capitate, upturned. *Fruit* (Fig. 154) 1-2 cm diam., globular, green or becoming yellowish, enclosed in enlarged, membranous, densely pubescent and prickly calyx tube; calyx lobes triangular, about 5 mm long. *Seeds* 1.5-2 mm long, light grey-brown, margin paler but not thickened, smooth, slightly translucent, the embryo sometimes seen within, 164, 206, 210, 250 and 238 seeds in five fruits examined. *Cotyledons* about 8 x 5 mm, ovate, glandular-ciliate, first true leaf glandular-hispid with a few stellate hairs. (Fig. 98.)

Chromosome number: $n = 12$ Randell & Symon (1976); in addition Symon 10050 also had $n = 12$.

Notes

Little variation is evident in the few collections available. The species is related to *S. lasiophyllum* from which it differs in its abundant glandular hairs, different tomentum, rotate corolla and fewer fruits. It differs from *S. ashbyae* in its globular rather than oval fruit, its globular calyx completely covering the fruit, its smaller stature and general lack of male flowers above the hermaphrodite ones. It is less closely related to *S. lachnophyllum* from which it differs in its abundant glandular hairs, leaf shape, and globular rather than elliptic fruits.

Distribution and habitat (Map 9)

W.A., Hamersley Ranges and adjacent area. It grows on rocky slopes and stony rises.

Selected specimens (total seen about 20)

WESTERN AUSTRALIA: *Clement s.n.*, Aug. 1900, between Ashburton & DeGray River (K); *Burbidge* 5965, 1958, Woodstock Stn (AD, CANB, PERTH); *Symon* 5389, 29.vi.1967, 48 km SE of Coonarie River crossing (ADW, B, CANB, K, NSW, PERTH, US); *Symon* 10050, 18.v.1975, Wittenoom Gorge (AAU, ADW, L, PERTH).

89. *Solanum prinophyllum* Dunal in DC., Prodr. 13 (1852) 296.

Type citation: "In Nova Hollandia circa portum Jackson (Gaudich. in h DC sub nomine *S. hystris*) (v.s. in h. DC)".

Holotype: G; Microfiche AD!

Solanum armatum R. Br., Prodr. (1810) 446; non *S. armatum* Forsk., Fl. aegypt.-arab. (1775) 47.

Type citation: "(J) v.v." J denotes Port Jackson and the area north to Newcastle, New South Wales.

Holotype: The specimen at BM bears the Bennett number 2675 and "14 *Solanum armatum* Nob. prodr 446 Port Jackson 1805-3", Isotypes are at K, two sheets.

Solanum armatum R. Br. *β. cultum* Dunal in DC., Prodr. 13 (1852) 295.

Type citation: In horto Monspel. cultum.

Holotype: MPU. *Isotype*: K, photos ADW.

Solanum xanthocarpum auct. nonn. non Schrad.

This name was misapplied to *S. prinophyllum* Dunal in Australia for a period (see literature under that species). It is an Asian species and does not occur in Australia.

Literature

As *S. armatum* R. Br. Dunal (1813) 224; Poiret (1814) 774; Dunal (1816) 42; Don (1837) 436; Walpers (1844) 87; Dunal (1852) 295; Bentham (1868) 458; Mueller (1882) 96; Bailey (1883) 346; Mueller (1888) 362; Turner (1891) 124; Cheel (1911) 158; Petrie (1912) 229; Bitter (1917a) 7; Hurst (1942) 367; Webb (1948) 157; Beadle, Evans & Carolin (1962) 402; Schreiber & Ripperger (1963) 792; Schreiber (1963) 465; Beadle, Evans & Carolin (1972) 489.



Fig. 99. *Solanum prinophyllum* Dunal. Drawn from field grown plant at the Waite Institute, from seed from D.W. Whitehead, collected from the Bouddi Range, NSW (ADW 40791). $\times 2/3$.

As *S. xanthocarpum* Schrad.: Moore (1893) 334; Hamilton (1899) 363; Bailey (1901) 1088; Dixon (1906) 223; Cheel (1908) 287; Carne (1910) 856; Bailey (1913) 357; Maiden & Betche (1916) 181; Brought *et al.* (1924) 492; Petrie (1925) 163; Carey (1930) 737; Ewart (1931) 1005.

As *S. prinophyllum* Dunal: Willis (1972) 554.

A sprawling annual or short lived *perennial* 15-45 cm long; prickles to 1 cm long, straight, pale, frequent on stems, petiole, upper and lower leaf surfaces and calyx, few on petioles, most parts pubescent with sparse tomentum of minute stellate hairs, (sessile, porrect-stellate with short or medium central cell) also minute simple glandular hairs,



Fig. 100. *Solanum prinophyllum* Dunal. Drawn from field grown plant at the Waite Institute, from seed of Webb & Tracey 10742, collected from Levers Plateau, NSW-Qld border (ADW 43589). $\times \frac{2}{3}$.

mainly on young growing points, nowhere dense or conspicuous, general aspect dark green or purplish-green, leaves concolorous. *Leaves* 5-8 x 3-4 cm, lanceolate-elliptic, with 7-10 well developed lobes, themselves with several small lobes or teeth, lobe tips acute or acuminate, sinuses rounded, cut about half way to midrib. *Inflorescence* a cluster of 1-4 flowers, from a short peduncle, floral rhachis equally short or lacking, solitary pedicellate flowers also occur, pedicels 8-10 mm long, slender. *Calyx* 5 mm long; lobes 1-2 mm long; veins green, intersinus tissue pale; prickles to 5 mm long. *Corolla* 1-1.5 cm long, broadly stellate, distinctly campanulate, lobes acute, exceeding interacuminal tissue, lilac-blue, (Sea Lavender Violet RHS 637/1. *Filaments* (Fig. 165) 1-1.5 mm long; anthers 2 mm long, oblong, loosely erect. *Ovary* with few glandular hairs; style 5-6 mm long, slightly sigmoid; stigma capitate, slightly bilobed, pale, relatively large. Fruiting pedicels 1-2 cm long, deflexed; calyx appressed, not greatly enlarged; *berry* (Fig. 155) 1.5-2 x 1.5 cm, globular or obovoid, marbled green, when mature drab greenish or tinged purple, (depends on temperature) finally soft and succulent. *Seeds* 2-3 mm long, rather thin and papery, ivory, with slightly thickened and reticulated margin, 516, 534, 536 seeds in 3 fruits. (Figs 99 and 100.)

Chromosome number: $n = 12$ Randell & Symon (1976); in addition Symon 4703 and Pearce 87.

Note

This species becomes increasingly variable and distinctive towards the northern limits of its range where the plants are larger, coarser, more prickly and somewhat more erect. It is most closely related to *S. pungetium* and *S. cookii*. Inadequate specimens may also be difficult to separate on leaf characters from *S. campanulatum*, from which it differs in many other details.

Distribution and habitat (Map 15c)

From south eastern Qld down the Great Dividing Ranges to eastern Vic. almost reaching Melbourne. Collected from roadsides, logging tracks, streambanks, margins of rainforest and as a sprawling undershrub in *Eucalyptus* woodland.

Selected specimens (total seen about 90)

QUEENSLAND: Webb & Tracey 10742, 14.ix.1973, N.S.W.-Qld border, Levers Plateau (ADW, CANB); Everist s.n., 14.ix.1961, Mt Glorious (ADW, BRI).

NEW SOUTH WALES: Sieber 254, 1826, New Holland (BM, G, K, L, NSW, TCD); Tindale & Constable s.n., 26.iii.1952, Mt Tomah (ADW, NSW).

VICTORIA: Morrison s.n., 5.iv.1872, Gippsland (CANB, E); Beaglehole 37807, 6.iv.1971, near Lakes Entrance (acb, ADW).

90. *Solanum multiglochidiatum* Domin, Biblioth. Bot. 89 (1929) 1140.

Type citation: "Nord-Queensland: trockene Grasstellen bei Mungana, auf Kalk (Domin II. 1910)".

Holotype: ?PR but not traced.

A clonal, herbaceous *perennial* to 25 cm long; stems sprawling, scarcely woody at base; underground rootstocks 5-10 mm thick; prickles to 6 mm long, fine, straight, pale, scattered or abundant on all parts except corolla and fruit; all parts pubescent with sparse tomentum of stellate hairs (sessile or shortly multiseriate-stalked, porrect-stellate with medium central cell); upper leaf surface almost glabrous except along main veins; general aspect green or yellowish-green, leaves concolorous. *Leaves* (5) 7 (-10) x (3-) 5 (8-) cm, ovate, with up to 7 broad shallow lobes, lobe apices rounded, sinuses rounded, rarely cut one fifth of way to midvein, or margins shallowly undulate-repand, leaf apex rounded or acute, leaf base shortly cuneate to truncate or rounded to subcordate; petiole 1-2 cm long.

Inflorescence a cyme of few to 10 flowers; peduncle 2-3 cm long; floral rhachis 1-5 cm long; pedicel 1-1.5 cm long. *Calyx* tube c. 3 mm long, lobes 5 mm long, triangular. *Corolla* 3-4 cm diam., broadly stellate to rotate, lobes rounded, interacuminal tissue equalling petal tip, pale lavender-blue. *Filaments* (Fig. 165) 2-3 mm long; anthers 7 mm long, tapered upwards, forming an erect cone. *Ovary* with some glandular hairs towards summit; style 1.5 cm long, sigmoid, eccentric, with some glandular hairs below; stigma small, terminal, green. Fruiting peduncles slightly lengthened (total length to 10 cm) bearing 1-5



Fig. 101. *Solanum multiglochidiatum* Domin. Drawn from pot grown plant at the Waite Institute, from Symon 4873, collected 24 km west of Petford and about 48 km south-east of Chillagoe, Qld (ADW 40389). $\times 2/3$.

fruits; calyx slightly enlarged, lobes to 1 cm long, long-triangular; *berry* (Fig. 155) 1.5-2 cm diam., succulent, translucent, pale yellowish-green, readily bursting. *Seeds* 3-3.5 mm diam., pale or yellowish, minutely reticulate, 16, 20 and 33 seeds in three fruits examined. *Cotyledons* c. 14 x 5 mm, lanceolate, petiole 1-2 mm long, first leaf very oblique, elliptic. (Fig. 101.)

Chromosome number: $n = 24$ Randell & Symon (1976).

Notes

Inadequate material is available to assess variability in the species. It is most closely related to *S. prinophyllum* and *S. pungetium* from both of which it differs in its leaf shape, the larger and more numerous flowers, and possibly an enlarged subwoody rootstock from which the herbaceous growths develop each season.

Distribution and habitat (Map 5)

This species appears restricted to Qld in its distribution and has only been collected from a little south of Chillagoe in *Eucalyptus* woodland.

Specimens examined

QUEENSLAND: *Domin s.n.*, Feb. 1910, near Mungana (?PR); *Symon 4873*, 23.v.1967, W of Petford (ADW, BRI, CANB, K, L, NSW).

91. *Solanum cookii* Symon, sp. nov.

Frutex erectus aut extendens ad 3 m. *Aculei* ad 1 cm, erectae, tenues, dispares, pallidi aut rubelli, ubique abundantes. Omnes partes pilis diversis pubescentes. Pili breves aut longi glandulares copiosi, pili stellati praecipue per costas in lamina inferioris folii; adspectu generali viridi, concolori. *Folia* 8-15 x 5-10 cm, ambitu ovato-elliptica sed 5-9 lobis brevibus irregularibus interdum angulatis dentatis vel lobatis, sinibus rotundatis, et nunquam plus quam $\frac{1}{3}$ ad nervium medium attingentibus; apex folii et lorum acutatus usque acuminatus, basis truncata usque subcordata, obliqua petiolus 3-6 cm longus, pro ratione tenuis. *Inflorescentia* cymosa extra-axillaris 1-10 flores; pedunculus 1.5-2 cm, rhachis floralis 1.5-3 cm; pedicellus circa 5 mm; tubus calycis 2-3 mm; lobi calycis 5-8 mm linear-lanceolati. *Corolla* 2 cm diametro, late stellata usque pentagonalis, caesia; filamenta 1-1.5 mm; antherae 4-5 mm, oblongae, erectae; stylus 5-6 mm erectus; stigma terminale, ultra antheras exigue excedens. Pedunculus et pedicellus fructifer parum accrescentes calyx basim fructus tegens; lobi 5-6 mm, angusti lanceolati; acumina linearia et distincta, fructum excedentia. *Bacca* 1-1.5 cm diametro, globularis, color et natura ignota. *Semina* 2-2.5 mm longa, pallida; 386 et 563 semina in duabus baccis.

Typus: D.E. Symon, 25.ii.1972, grown Waite Institute from seed collected by Webb & Tracey 8355, x.1969, Upper Lankelly Creek on the western slopes of the McIlwraith Range, N.E. of Coen, Cape York, Queensland. This is a very prickly shrub to 45 cm high in deciduous vine forest on soils derived from granodiorite. Alt. 366 m. Holotypus: ADW. Isotypi: BRI, CANB, K. (Fig. 96.)

Solanum adenophorum F. Muell. var. *indivisum* Domin, Biblioth. Bot. 89 (1929) 1140.

Type: Dallachy, Rockingham Bay, Queensland now at K, photo ADW.

An erect or sprawling *shrub* to 3 m, not known to be clonal; prickles to 1 cm long, straight, fine, unequal, pale or reddish, abundant on stems, petioles, upper and lower leaf surfaces, peduncle, pedicel and calyx; all parts with varied hairs, short or long (several-celled) glandular hairs abundant; stellate hairs with long several-celled central hair, occur mainly along veins on lower leaf surface; general aspect green, concolorous. *Leaves* 8-15 x 5-10 cm, ovate-elliptic, with 5-9 shallow, irregular, somewhat angular lobes, themselves slightly toothed or lobed, sinuses rounded and nowhere cut more than $\frac{1}{3}$ of way to midvein, leaf and lobe apices acute to acuminate; base truncate to subcordate, oblique; petiole 3-6 cm long, relatively slender. *Inflorescence* a cyme of few to 10 flowers from an extra-axillary position; peduncle 1.5-2 cm long; floral rhachis 1.5-3 cm long; pedicel c. 0.5 mm long. *Calyx* tube 2-3 mm long; lobes 5-8 mm long, linear-lanceolate. *Corolla* 2 cm diam., broadly stellate to pentagonal, pale lavender blue. *Filaments* (Fig. 165) 1-1.5 mm long; anthers 4-5 mm long, oblong, erect. *Style* 5-6 mm long, erect;

stigma terminal, just exceeding anthers. Fruiting peduncles and pedicels not much enlarged; calyx covering base of fruit; lobes 5-6 mm long, narrow lanceolate; acumens linear, distinct; together longer than fruit; *berry* (Fig. 155) 1-1.5 cm diam., globular, colour and texture not known. *Seeds* 2-2.5 mm long, pale or buff, 386 and 563 seeds in two fruits. *Cotyledons* about 9 x 6 mm, ovate, petiole 7 mm long, first leaf 12 x 12 mm broad ovate-cordate. (Fig. 102.)



Fig. 102. *Solanum cookii* Symon. Drawn from pot grown plant at the Waite Institute, from seed from Webb & Tracey 8355, collected on the Upper Lankelly Creek, on the western slopes of the McIlwraith Range, north-east of Coen, Qld (ADW 40381). $\times \frac{2}{3}$.

Chromosome number: $n = 12$ Randell & Symon (1976) as "sp. nov. No. 8", Webb & Tracey 8355.

Notes

S. cookii is most closely related to northern forms of *S. prinophyllum* Dunal from which it differs in leaf shape and lobing, the tomentum, especially the abundance of glandular hairs, and its more numerous and smaller fruits.

Distribution and habitat (Map 9)

Northern Qld in the tropical scrubs inland from Cairns and further north on Cape York at the McIlwraith Range. It has been recorded from vine forests on soils derived from basalts and from granodiorite.

Selected specimens (total seen about 10)

QUEENSLAND: Webb & Tracey 8355, Oct. 1969, Upper Lankelly Creek, McIlwraith Range (ADW, BRI); Hyland 5523, 22.ix.1971, Herberton (ADW, BRI).

92. *Solanum pungetium* R. Br., Prodr. (1810) 446.

Type citation: "(J) v.v.". J denotes Port Jackson and the area north to Newcastle, New South Wales.

Type material: The collection at BM bears the Bennett number 2679 and two labels "17 *Solanum cpr pungetium* prodr. 446 Port Jackson 1803" and "17 *Solanum pungetium* prodr 446 Port Jackson 1802-4", and is selected here as the lectotype. Isolectotypes are at K, two sheets, and P.

Solanum pungentium (sic) R. Br. An orthographic error used by Domin, Biblioth. Bot. 89 (1929) 1139.

Literature

Brown (1810) 446; Dunal (1813) 224; Poiret (1814) 774; Dunal (1816) 43; Don (1837) 436; Walpers (1844) 87; Dunal in DC. (1852) 295; Benthams (1868) 459; Mueller (1868) 146; Mueller (1882) 96; Bailey (1883) 346; Mueller (1888) 362; Moore (1893) 334; Hamilton (1899) 363; Bailey (1901) 1089; Dixon (1906) 223; Bailey (1913) 357; Maiden & Betche (1916) 181; Hamilton (1917) 287; Chisholm (1925) 294, 297; Domin (1929) 1139; Ewart (1931) 1006; Hurst (1942) 374; Beadle *et al.* (1962) 402; Beadle *et al.* (1972) 489; Willis (1972) 554.

A sprawling annual or short-lived *herb* to 1.5 m tall, slightly woody towards base; prickles to 6 mm long, straight, pale or reddish, scattered on stems, peduncles, petioles, upper and lower leaf surfaces; all parts pubescent with tomentum of stellate hairs (sessile or shortly multiseriate-stalked, porrect-stellate with long central ray) sparse on upper leaf surface, more dense below; general aspect green. *Leaves* slightly discoloured, to 6 x 3 cm, elliptic with 5-9 bluntly or irregularly triangular lobes, sinuses rarely cut halfway to midvein, lobe and leaf apices rounded or acute, base truncate; petiole about 1 cm long. *Inflorescence* a cluster of 1-3 flowers in an extra-axillary position; peduncle and floral rhachis absent or very short; pedicel to 4 cm long, slender. *Calyx* tube 2-3 mm long; lobes 3-4 mm long, apices acuminate. *Corolla* 1.5-2 cm long, campanulate-rotate. *Filaments* (Fig. 165) 2 mm long, slender; anthers 4 mm long, oblong. *Ovary* globular, glabrous; style c. 1 cm long, sigmoid; stigma capitate, very slightly bilobed. Fruiting pedicel 2.5-4 cm long; calyx enlarged to cover base of fruit; *berry* (Fig. 155) 2.5-3 cm diam., first marbled green, later yellowish. (Fig. 103.)

Chromosome number: $n = 12$ P. Sharp (unpublished), voucher Cameron 3138.

Notes

It appears to be an unimpressive plant in the field and rarely stimulates its collectors to descriptive phrases. It is closely related to *S. prinophyllum* which has larger, more deeply divided leaves, more prickles, and larger fruits which are perhaps yellower when ripe. It is less closely related to the northern *S. cookii*.

Distribution and habitat (Map 2)

N.S.W. along the east coast, and Vic. in the far south east. It has been reported on basaltic soils and on those from granites on hillsides or in creek lines.

Selected specimens (total seen about 50)

NEW SOUTH WALES: *Banks s.n.*, 1770, Botany Bay (BM, BRI); *Sieber 254*, New Holland (OXF, P, TCD); *Constable s.n.*, 12.ix.1953, slopes of Mt Dromedary (K, NSW); *Constable 5453*, 4.xi.1964, 2 km N of Cobargo (ADW, NSW).

VICTORIA: *Williamson s.n.*, Jan. 1920, Genoa (ADW); *Beaughlehole 31256*, 25.x.1969, Orbost (acb, ADW).



Fig. 103. *Solanum pungetium* R. Br. Drawn from herbarium specimen, ADW 39282, collected by A.C. Beaughlehole from near Orbost, Vic. Fruit from ADW 40050, collected from Mallacoota Inlet National Park, Vic. $\times \frac{2}{3}$.

93. *Solanum hystrix* R. Br., Prodr. (1810) 446.

Type citation: "(M) v.v.". M denotes Ora Meridionalis the south coast from Cape Leeuwin, Western Australia to Wilson Promontory, Victoria.

Type material: A sheet at BM contains three collections of which one has the label below it with the Bennett number 2677 and "*Solanum hystrix* Anch. 5 South Coast Feby. 1802". Anchorage 5 was off the Franklin Isles, South Australia; this specimen is proposed as lectotype.



Fig. 104. *Solanum hystrix* R. Br. Drawn from pot grown plant at the Waite Institute, grown from seed collected by C.R. Alcock, Hd of Yalanda, Eyre Peninsula, SA (ADW 40501, ADW 28926 for fruit). $\times \frac{2}{3}$.

Literature

Brown (1810) 446; Dunal (1813) 232; Poiret (1814) 780; Dunal (1816) 45; Don (1837) 438; Walpers (1844) 90; Dunal in DC. (1852) 296; Bentham (1868) 458; Mueller (1880) 171; Mueller (1882) 96; Maiden (1889a) 543; Mueller & Tate (1896) 373; Tate (1890) 145; Maiden (1899) 625; Richards (1882) 136; Maiden & Betcher (1913) 252; Black (1916) 56; Black (1921) 5; Black (1926) 498, 696.

A sprawling, clonal, herbaceous *perennial* 5-25 cm long; stems rarely lasting more than one season, sometimes forming little more than a rosette of leaves; prickles to 1.5 cm long, pale, straight, abundant on stems, petioles, upper and lower leaf surfaces, peduncles, pedicels, calyx and a few on corolla; leaf surface almost glabrous between prickles, or hispid with a few simple, several-celled hairs on main veins, petiole and twigs, also occasional reduced stellate hairs in which lateral cells are not well developed, minute glandular hairs also occur on pedicels, calyx, leaf axils and at base of some of larger hairs; general aspect green. *Leaves* scarcely discolourous, (3-) 5 (-7) x (1-) 1.5 (-2) cm, elliptic, with 5-11 bluntly triangular lobes, sinuses rounded and reaching about half way to midrib, lobes themselves with to 2 smaller shallow lobes, lobe and leaf apex rounded or acute, leaf base cuneate, very oblique. *Inflorescence* a 1-10-flowered cyme from extra-axillary position; peduncle 0.5-1 cm long; floral rhachis 1-3 cm long; pedicel 0.5-1 cm long. *Calyx* tube 2-3 mm long; lobes 2-3 mm long, triangular. *Corolla* 1.5-2.5 cm diam., broadly stellate to rotate, pale blue or white. *Filaments* (Fig. 165) 1 mm long; anthers 5 mm long, oblong. *Ovary* glabrous; style erect; stigma green. Fruiting peduncle 3 cm long, pedicel 2 cm long, *berry* (Fig. 155) 1.5-2.5 cm diam., globular, enclosed in enlarged membranous prickly calyx which may burst irregularly, berry finally drying almost black. *Seeds* 2-2.5 mm long, dark grey to almost black, minutely reticulate, in six fruits (118-) 153 (-204) seeds were counted. (Fig. 104.)

Chromosome number: $n = 12$ Randell & Symon (1976).

Notes

S. hystrix displays little variability and specimens differ more in overall size than in morphological characters. It is closely related to *S. hoplopetalum* from which it is separated by the Nullarbor Plain. It differs from that species in being substantially glabrous between the prickles, having few hairs of any form. Disjunct distributions are common in many Australian species of *Solanum* and the amount of speciation that has proceeded is variable. Some populations now disjunct have been given species rank as in this case, but in others no taxonomic distinctions have been made, e.g. *S. esuriale*. A number of native species of *Solanum* have had their areas of distribution increased in response to disturbance of the original habitat and have been transported to more distant sites. The single specimens of *S. hystrix* recorded for both W.A. and N.S.W. probably belong to this category and do not represent natural disjunct populations.

Distribution and habitat (Map 9)

S.A., Eyre Peninsula and some offshore islands. It grows mainly on the sandy plains.

Selected specimens (total seen 65)

WESTERN AUSTRALIA: *Howard s.n.*, 20.v.1968, 161 km E of Norseman (ADW, CANB, PERTH).

NEW SOUTH WALES: *Lamont 248*, ix.1883, Coonabarabran (BM).

SOUTH AUSTRALIA: *Alcock 10*, 7.xi.1964, Lucky Bay near Cowell (AD, CANB); *Symon 4482*, 13.ii.1967, 5 km E of Kimba (ADW, BIRM, CANB, DAV, HUJ, K, NSW).

94. *Solanum hoplopetalum* Bitt. & Summerh., Kew Bull. (1926) 116-118.

Type citation: Western Australia:- (1) Merredin, May 1925, *E.J. Limbourne*, Herb. Kew, Type; (2) Between the Ashburton and De Gray Rivers, *E. Clement* [K]; (3) Coolgardie District Londonderry, Oct. 1900, *E. Kelso* [NSW, K]; (4) Dedari, No. 8 Pumping Station c. 300 m Alt. Sept. 1903, *G.H. Thiselton-Dyer* 112, Herb. Kew [K]; (5) Yilgarn, near Southern Cross, barren places of dense bush on laterite, *Diels* 1706, Herb. Berol. [not seen].

Holotype: (1) K. *Isotype*: MEL.



Fig. 105. *Solanum hoplopetalum* Bitt. & Summerh. Drawn from photograph and from herbarium specimen, Symon 5476, collected 37 km south of Menzies, WA (ADW 33007). $\times 2/3$.

Literature

Black (1926) 696; Meadly (1960) 401 as *S. hystrix*; Paterson (1967) 166 as *S. hystrix*; Grieve & Blackall (1975) 601 as *S. hystrix*.

Common name: Afghan thistle, prickly potato weed.

A sprawling, clonal, perennial *herb*, 10-35 cm long, stems rarely lasting more than one season; prickles to 1.4 cm long, straight, pale, abundant on stems, upper and lower leaf surfaces, peduncle, pedicel, calyx and corolla; hispid with simple, several celled hairs (probably reduced stellate hairs) consisting of a stipe, an almost globular central cell (from which lateral cells have not developed) and long erect central cell which may be glandular; below these are numerous, minute glandular hairs, general aspect green. *Leaves* 4-12 x 1-5 cm, elliptic, deeply lobed with 3-6 lobes on each side, cut two thirds of way to mid rib, lobes themselves oblong-triangular, with several smaller shallow lobes or teeth, sinuses rounded, apices rounded or acute, base rounded or truncate, oblique. *Inflorescence* a 4-8-flowered cyme from an extra-axillary position; peduncle to 3 cm long; floral rhachis 1-2 cm long; pedicel 5 mm long. *Calyx* 1-2 mm long; tube 5 mm long, almost obscured by prickles; lobes 3-5 mm long, triangular. *Corolla* 1.5-3 cm diam., broadly stellate to subrotate; lobes acute, pale blue or white, lobes with prickles on main vein and abaxial tips. *Filaments* (Fig. 165) 1 mm long; anthers 4-5 mm long, oblong-lanceolate. *Ovary* and style glabrous; stigma terminal. Fruiting peduncle and pedicel lengthened, *berry* (Fig. 155) 1.5-2 cm diam., globular or depressed-globular, almost enclosed by enlarged membranous, very prickly calyx, at first bright green, finally drying almost black. *Seeds* 2.5 mm long, dark grey, flattened, irregularly obovate to subreniform. (Fig. 105.)

Chromosome number: $n = 12$ Randell & Symon (1976).

Note

This is one of the relatively few native species that has become weedy and is of minor importance as a weed in some cereal and sheep growing areas of W.A. *S. hoplopetalum* is closely related to *S. hystrix* an equivalent species in Eyre Peninsula, from which species it differs in the presence of hispid and reduced stellate hairs which may be glandular. The two are now separated by the Nullarbor Plain but are likely to have had a common origin in the past. The two species may be distantly related to some of the much larger shrubby to arborescent species of the rainforest areas of eastern Australia which have in common, particularly in their juvenile phases, prickly lobed leaves, green aspect, pale flowers, and large fruits. They may be the relics of a much earlier tropical flora now reduced and adapted to the arid climate prevailing in these areas.

Distribution and habitat (Map 9)

W.A., in the southern drier areas to just north of Menzies. It occurs on roadsides and agricultural sites and in open woodlands on the sandy plains.

Selected specimens (total seen about 30)

WESTERN AUSTRALIA: Symon 5476, 6.vii.1967, 37 km S of Menzies (ADW, B, CANB, K, NSW, PERTH, US); Symon 9908, 11.v.1975, just N of Kalgoorlie on road to Wiluna (ADW, B, K, L, MO, US).

95. *Solanum macoorai* F.M. Bail., Qld Dept. Agric. Bull. 8 (1893) 80.

Type citation: "Summit of south peak Bellenden-Ker, June 1889".

Holotype: BRI. (This consists of four separate leaves).

Literature

Bailey (1901) 1082; Bailey (1913) 354; Domin (1929) 1132.

Common name: The colourful, if offensive, name 'gin's whiskers' is used for this species.

An erect *shrub* or small *tree* to 4 m or more tall, sparsely branched below, not known to be clonal, young plants stiffly erect; prickles to 1 cm long, rigid, directed slightly upwards, particularly striking and abundant on lower main stem, on young plants abundant on



Fig. 106. *Solanum macoorai* F.M. Bail. Drawn from field grown plant from Symon 4752, collected from Forestry Reserve near Atherton, Qld (ADW 37172). $\times 2/3$.

upper and lower leaf surfaces, increasingly sparse to absent on distal twigs and mature leaves; young twigs, leaves and buds pubescent with tomentum of minute stellate hairs (sessile, porrect-stellate with short central ray), later becoming glabrous and upper and lower surfaces of mature leaves sparsely pubescent along veins, general aspect dark or purplish-green, leaves concolorous. *Leaves* showing great range in size, seedling leaves 11-25 x 4-10 cm, elliptic, with 11-17 shallow angular lobes, sinuses shallow and rounded or acute, apical lobes acute to acuminate, leaf apex acuminate, leaf base cuneate to truncate, oblique; all very prickly; petiole 3-6 cm long; mature leaves 5-10 x 3-4 cm, elliptic, almost entire or with shallow, weakly defined lobes or teeth, apex acute to acuminate, base rounded or cuneate, equal or oblique; petiole 1-2 cm long. *Inflorescence* a short cyme of to 12 flowers from an extra-axillary position; peduncle 1-2 cm long; floral rhachis short and congested; pedicels c. 1 cm long, slender, slightly thickened upwards. *Calyx* tube 2-3 mm long, shallow; lobes c. 2 mm long; acumens 1 mm long. *Corolla* 2-3 cm diam., stellate; lobes triangular, flat or reflexed, mauve. *Filaments* (Fig. 165) 1-1.5 mm long; anthers 4.5 mm long, distinctly tapered upwards, loosely erect. *Ovary* stellate pubescent at summit; style c. 5 mm long, erect, pale, stellate-pubescent below, slightly thickened upwards; stigma terminal, greenish. Fruiting pedicels 2-3 cm long, distinctly thickened, grooved above berry, slender at junction with peduncle; calyx lobes 5 mm long, triangular; *berry* (Fig. 156) 1.5-2 cm diam., globular or obovate, yellow to orange-red, succulent, readily shed with its pedicel when ripe. *Seeds* 3 mm long, pale or light yellowish-brown, minutely rugose towards margins, (69) 119 (178) in 8 fruits examined. (Fig. 106.)

Chromosome number: not known.

Notes

There is great morphological variation between juvenile and adult phases of this species; the lower main stem may be spectacularly prickly. The species is closely related to its more southerly equivalent, *S. inaequilaterum*, from which it differs in having less deeply lobed juvenile leaves, taller stature, eglandular calyx and yellow to orange fruits. The two species have been confused until recently. The inadequacy of the type material has made more difficult any assurance of correct application of the name.

Distribution and habitat (Map 1)

Northern Qld in the vicinity of the Atherton tableland. It grows in disturbed sites of rainforest clearings, tracks and forest margins.

Selected specimens (total seen about 15)

NORTH QUEENSLAND: Symon 4752, 17.v.1967, Forest Reserve, Atherton (ADW, B, BRI, CANB, K, US); Smith 14682, 12.vi.1969, Mt Bellenden Ker (ADW, BRI); Hyland 7643, 21.ix.1974, McIlwraith Range, (ADW, CANB, QRS).

96. *Solanum sporadotrichum* F. Muell., Chemist & Druggist, (Melb. Chemist) Oct. (1882) 48.

Type citation: "On Mount Dryander - Kilner and Fitzalan" Mt. Dryander is about 36 km S.E. of Bowen, Queensland.

Type material: At K is a sheet labelled "*Solanum sporadotrichum* F.v.M. Near Port Dennison Queensland. E. Fitzalan". At MEL are two sheets, the first MEL 12283 has the label "*Solanum sporadotrichum* F.v.M. Port Dennison Fitzalan" and a note by R.V. Smith 1952, stating that the specimen is probably part of the type collection and that Mueller was using Port Dennison in a broad sense. The second sheet MEL 12282 bears two labels (a) "*Solanum sporadotrichum* F.v.M., Mount Dryander Kilner & Fitzalan" and (b), "diff. on scantiness of hair on branchlets, grows longer peduncles, and more

numerous shorter pedicels, absence of prickles on the calyces, more elongated lobes of the corolla longer & tapering anther, the berries will likely prove also different" and in ink "var. *S. pungetium*".

Lectotype: I propose MEL 12282 as lectotype.

Literature

Mueller (1882) 96; Bailey (1883) 344; Bailey (1901) 1083; Bailey (1913) 354; White (1918) 151.

Apart from the recent collections of vegetative material from Mt Dryander by R. Henderson, V. Moriarty and J. Swan cited below, authentic material of *S. sporadotrichum* has not been recognised and Mueller's original description is repeated here.

"Shrubby; branchlets almost glabrous, but copiously armed with short and slender prickles; leaves nearly ovate in outline, of herbaceous consistence, green on both sides, not much narrowed or even truncated at the base, and there sometimes very inequilateral, wavy or sinuous indented at the margin, generally pointed at the summit, their starry hair scattered on both sides, or sometimes crowded on the lower page; the prickles on either side few or sometimes entirely wanting, especially on the lower side; racemes short, with few or several flowers, beset throughout with scattered star-hair; but unarmed; lobes of the calyx terminated in long narrow ends; corolla white, deeply divided, about twice as long as the calyx; filaments very short; anthers nearly half as long as the corolla, free, gradually attenuated upwards, style glabrous; fruit unknown.

On Mount Dryander—Kilner and Fitzalan at K. Among Australian species this taxon is nearest to *S. pungetium*, differing mainly in scantiness of hair on the branchlets, generally longer peduncles, shorter and more numerous pedicels, absence of prickles on any portion of the racemes, more elongated lobes of the corolla, longer, upward and distinctly tapering anthers; the berries will also likely prove different."

Chromosome number: unknown.

Note

The inadequate material available suggests that *S. sporadotrichum* is closely related to *S. inaequilaterum* and *S. macoorai*. These species occur in the disjunct areas of rainforest up the Qld coast. They probably have a common ancestor and varying degrees of speciation in isolation has proceeded.

The description and leafy specimen do not support a relationship to *S. pungetium*. Both *S. inaequilaterum* and *S. macoorai* have large, lobed, prickly juvenile leaves, followed by simpler much less prickly leaves, both having stellate flowers and being small or large shrubs which are woody below (not sprawling sub-herbaceous cf. *S. pungetium*). The fruits could be expected to be relatively large and orange to scarlet in colour.

Distribution and habitat

Qld: Mt Dryander and adjacent areas in tropical forest on grey sandy loam (Henderson 2213).

Selected specimens (all cited)

QUEENSLAND: Henderson 2180, 20.vii.1974; Swan 78, 20.vii.1974; Henderson 2213, 21.vii.1974; 15 km N of Proserpine, NE crest of ridge leading to easterly peak of Mt Dryander (all at ADW, BRI).

97. *Solanum inaequilaterum* Domin, Biblioth. Bot. 89 (1929) 1135.

Type citation: Süd-Queensland: Regenwälder der Beech Mts. (Domin s.n. III 1910).

Type specimen: possibly PR but not traced.

Literature

As *S. sporadotrichum* F. Muell.: Moore (1893) 333; Dixon (1906) 222; Maiden & Betcher (1916) 181.

A *shrub* to at least 2 m high; young plants stiffly erect, branching towards top; older stems finally with corky bark; prickles 5-12 mm long, conspicuous and dense on main stem, straight, pointed slightly upwards, abundant on petioles, upper and lower leaf surface, less conspicuous and scattered on later twigs and leaves, absent from pedicel and calyx; tomentum of scattered stellate hairs (sessile, porrect-stellate with short or long central ray) rarely dense or forming a complete cover on lower side of leaf, pedicel and calyx with conspicuous, long, glandular hairs. Juvenile leaves to 20 x 15 cm, often purplish below, with dark green aspect, elliptic, with up to 9 main lobes, lower pair of



Fig. 107. *Solanum inaequilaterum* Domin. Drawn from herbarium specimen, Moriarty 924, from Mt Nardi, NSW (ADW 41103). $\times \frac{4}{3}$.

lobes smaller and rounded, second and later pairs deeply lobed $\frac{1}{2}$ to $\frac{2}{3}$ of way to midrib, sinuses rounded, leaf and lobe apices acute or acuminate; petiole to 5 cm long; mature leaves 4-15 x 2-5 cm, elliptic, entire or with up to 7 shallow bluntly triangular lobes, sinuses shallow and rounded, lobe apices obtuse, leaf apex acute or acuminate; petiole 1-3 cm long. *Inflorescence* a congested cyme of up to 10 flowers, solitary flowers also occur; peduncle about 1 cm long; floral rhachis 1 cm long; pedicel 1 cm long. *Calyx* tube short, lobes about 8 mm long, linear-lanceolate. *Corolla* 2.5-3.5 cm diam., broadly stellate, blue. *Filaments* (Fig. 165) 1.5 mm long; anthers 5-6 mm long, oblong-lanceolate, loosely erect. *Ovary* with few glandular hairs; style 8-10 mm long, erect; stigma terminal, slightly bilobed, greenish. Fruiting pedicel 2 cm long, somewhat thickened and swollen in upper half; calyx lobes little enlarged; *berry* (Fig. 156) 1-1.8 cm diam., globular or slightly ovoid, succulent, finally scarlet-red, close to RHS Mars Red 013. *Seeds* 3-3.5 mm long, flattened, notched at hilum, pale or light brown, minutely reticulate, (22-) 82 (-139) in 17 fruits examined. *Cotyledons* broad lanceolate, about 8 x 4 mm, petiole 1-2 mm long, first leaf ovate, 12 x 12 mm, second leaf prickly. (Fig. 107.)

Chromosome number: $n = 12$ Randell & Symon (1976).

Notes

Variation occurs in the lobing of the leaves especially in young plants. *S. inaequilaterum* is closely related to its northern equivalent *S. macoorai* from which it differs in its smaller stature, more deeply lobed juvenile leaves, less ferociously prickly juvenile phase, long multicelled glandular hairs on the calyx and scarlet rather than ochre-yellow or orange fruits.

Distribution and habitat (Map 15b)

Qld in the south east and N.S.W. in the north east. It is confined to disturbed sites and the margins of forests in high rainfall areas.

Selected specimens (total seen about 25)

QUEENSLAND: Telford 629, 19.v.1969, Lamington Nat. Pk (ADW, CBG).

NEW SOUTH WALES: Moriarty 924, 15.v.1972, Mt Nardi (ADW, K, L, NSW); Constable 6549, 29.xi.1965, Mt Merino (ADW, NSW).

98. *Solanum dallachii* Benth., Fl. austral. 4 (1868) 456.

Type citation: "Queensland: Rockingham Bay, *Dallachy*".

Type material: At K are two sheets both labelled "*Solanum dallachii* Benth. Rockingham Bay, *Dallachy* F. Mueller 1868". At MEL are five sheets labelled syntype with the following labels (1) MEL 11655 "Sunday 22nd May 1864 *Solanum* flowers blue on undershrub 12 feet high, Rockingham Bay, growing in dense scrub fruit yellow 96"; (2) MEL 11656 "17 Jan. 1864, *Solanum* flowers blue only saw one foliage large light green plant 6 feet high in edge of creek on the road to the valley of Lagoons"; (3) MEL 11657 "December 7-9 1867 Dalrymple Gap and Herbert riv fruit yellow when ripe"; (4) MEL 11658 "Murray River Aug. 1867, flower blue 4 feet high" and "*Solanum Dallachyi* Benth. Rockingham Bay, Pappus frts and fls of a Composite on the leaves"; (5) MEL 11659 "96" and "*Solanum Dallachyi* Benth. Rockingham Bay". On the basis of hand writing and date it is unlikely that MEL 11657 and MEL 11658 are part of the type collection and I propose the sheet at K with the two twigs as lectotype, isotypes MEL 11655, 11656, 11659 and an isotype at G.

Literature

Bentham (1868) 456; Mueller (1868) 145; (as *repandum*); Mueller (1882) 96; Bailey (1883) 345; Bailey (1901) 1087; Bailey (1913) 354.

A *shrub* to 4 m tall; prickles to 6 mm long, straight, pale, scattered on upper and lower leaf surface, rare or absent on mature growth, common on juvenile stems and leaves; all parts with tomentum of stellate hairs (mostly sessile multiseriate-stalked, porrect-stellate with short lateral ray and very long central ray), minute on juvenile leaves, sparse on upper leaf surface of adult leaves, more dense below, loose and floccose on twigs and young shoots, general aspect green, leaves slightly discolourous. Juvenile *leaves* to 28 x 15 cm, broadly elliptic, with 11-15 broadly triangular lobes, leaf and lobe apex acute, lobes rarely with secondary lobes, sinuses shallow and rounded, cut about one tenth of way to



Fig. 108. *Solanum dallachii* Benth. Drawn from syntype specimen, collected by Dallachy at Rockingham Bay, Qld (MEL 11659). $\times 2/3$.

midvein, petiole to 5 cm long, grooved above at least when dry. *Inflorescence* a cyme of up to 16 flowers from an extra-axillary position, lower flowers hermaphrodite, upper flower male; peduncle to 1.5 cm long; floral rhachis 2-5 cm long; pedicel 1.5 cm long. *Calyx* 2-3 mm long; lobes broadly and bluntly lanceolate, acumen small. *Corolla* 2.5-3 cm diam., deeply stellate with pale 'star' towards base, often reflexed, close to RHS *Heliotrope* 636/1. *Filaments* (Fig. 165) short; anthers c. 6 mm long, lanceolate, loosely erect in cone. *Ovary* densely pubescent towards apex; style 7-8 mm long, erect, pale, pubescent almost to summit; stigma terminal, green, exserted 2-3 mm above anthers, upper flowers often male, similar in form but ovary, style and stigma greatly reduced or vestigial. Fruiting pedicel to 3 cm long, thickened and furrowed towards apex, calyx barely covering base of fruit, at first appressed later raised, *berry* (Fig. 156) 1.5-2.5 cm diam., broadly ovate, reported yellow (Bentham), in cultivation green above, suffused pale ivory-green below, firm but not succulent, shed with pedicel. *Seeds* 2.5 mm long, flattened, pale, minutely reticulate towards margin, 168 seeds counted in one fruit. (Fig. 108.)

Chromosome number: $n = 24$ pot grown from *Hyland* 7367, counted by D. Jewell.

Notes

Like *S. furfuraceum* R. Br. later collections have not matched the original types very well, and it is difficult, considering the problems in the genus, to circumscribe the species with assurance. The rainforest species of *Solanum* from the east coast of Australia are still not well represented in collections. All of them show a great range of leaf morphology particularly between juvenile and later leaves, in this taxon, large, lobed, and prickly versus entire and unarmed, rarely are adequate accounts of the fruits available.

Distribution and habitat (Map 7)

Northern Qld, in disturbed sites in rainforest, along tracks and in openings and margins of wet scrubs.

Selected specimens (total seen about 20)

QUEENSLAND: *Webb & Tracey* 10752, 22.viii.1972, Macdowall Range (ADW, B, BRI, CANB, K, L, MO, NSW); *Webb & Tracey* 10793, June 1973, Mt Sampson (ADW, BRI, CANB); *Hyland* 7367, 11.vii.1974, Wyvuri Holding (ADW, BRI, CANB).

99. *Solanum furfuraceum* R. Br., Prodr. (1810) 446.

Type citation: "(T) v.v." T denotes Littus intra Tropicum, i.e. the coast of Queensland and the Northern Territory westward to Arnhem Bay.

Type material: At BM a sheet bears the Bennett No. 2672 and the label "10 *Solanum furfuraceum* prodr 446 desc (?) Hort. No. 68A Broadsound". This is proposed as lectotype. There are isoelectotypes at K & MEL.

Literature

Brown (1810) 446; Dunal (1813) 182; Poiret (1814) 777; Dunal (1816) 26; Don (1837) 424; Walpers (1844) 67; Dunal (1852) 293; Bentham (1868) 455; Bailey & Tenison-Woods (1879-80) 171-72; Mueller (1882) 96; Bailey (1883) 345; Bailey (1901) 1086; Bailey (1913) 354; White (1920) 29; Domin (1929) 1138; Webb (1952) 94.

An erect *shrub* 1.5-2 m tall woody below, older stems with pale corky bark; prickles to 1 cm long straight, scattered on younger stems, petiole, upper and lower leaf surface, absent from mature growth and from inflorescences; all parts pubescent with stellate hairs (minute sessile porrect-stellate above, long or short multiserial-stalked, porrect-stellate with moderate central ray below), sparse and scattered above, dense below, yellowish-green; general aspect dark drab-green; leaves discolorous. *Leaves* often geminate, the smaller about two-thirds the size of the larger, juvenile leaves to 17 x 12 cm, broadly ovate, with up to 5 bluntly triangular lobes on each side, sinus rounded and cut one fifth of way to midrib, mature leaves smaller, c. 7 x 4 cm, broad lanceolate to elliptic, entire or with 3-4

broad bluntly triangular lobes, the sinuses shallow, leaf apex acute to acuminate, base broadly cuneate to rounded, petiole (0.5-) 1-1.5 (-4.5) cm long. *Inflorescence* a condensed cyme of 3-9 flowers; peduncle 0-5 mm long; floral rhachis to 1 cm; pedicel 1 cm long. *Calyx* lobes 2-4 mm long, lanceolate, tapering into a linear acumen 2-4 mm long. *Corolla* 2.5-3.5 cm diam., broadly stellate, interacuminal membrane not exceeding petal tip, bluish-purple, often reflexed when fully open. *Filaments* (Fig. 165) 2-3 mm long, anthers



Fig. 109. *Solanum furfuraceum* R. Br. Drawn from pot grown plant at the Waite Institute, from seed from Henderson 1266, collected in southern Qld (ADW 42139). $\times 2/3$.

5 mm long, oblong, loosely erect. *Ovary* with few glandular or stellate hairs towards apex; style 7-9 mm long, erect, sparsely pubescent below; stigma greenish. *Fruits* in clusters of 1-3 (-4), peduncle and pedicel not much enlarged; calyx stellate, lobes to 1.5 cm long; *berry* (Fig. 156) 1.5-2 cm diam., globular or depressed globular, greenish (in the field) or yellowish-green (in cultivation), calyx raised or appressed, firm, not aromatic, shed with pedicel when ripe; *seeds* 1.5-2 mm long, pale yellow or brownish, (48-) 163 (-523) in 12 fruits counted. *Cotyledons* 10 x 7 mm, ovate-acute, first leaf 1-1.5 cm diam., almost orbicular, second leaf 2 x 1.5 cm, broad ovate, with shallow rounded lobes, both with sparse, scattered, pale prickles. (Fig. 109.)

Chromosome number: $n = 12$ Randell & Symon (1976).

Distribution and habitat (Map 17c)

In high rainfall areas of the Dividing Range in south east Qld and north east N.S.W. Often at the margins of vine or rain forests and at higher altitudes.

Notes

This species varies in the abundance of prickles which are rare or absent on mature twigs. Lower juvenile leaves are shallowly lobed and prickly while later ones are entire and unarmed. It is most closely related to *S. brownii* Dun.

None of the recent collections match the type material particularly well which by comparison has smaller leaves and intensely rusty tomentum.

Selected specimens (total seen about 15)

QUEENSLAND: *Moriarty* 1467, 1.ix.1973, near Yattoon Creek on Savina-Marlborough Road (ADW, BRI, CANB); *Telford* 3212, 26.ix.1973, Spring Creek Plateau, 13 km ENE of Killarney (ADW, BRI, CBG); *Webb & Tracey* 10749, Feb. 1972, Neurum Creek, NW of Brisbane (ADW, CANB).

NEW SOUTH WALES: *Webb & Tracey* 10740, 23.iii.1972, Levers Plateau on NSW-Qld border (ADW, CANB, K and cultivated material to ADW, BRI, CANB, K, MO, NSW); *Henderson* 1284, 5.iv.1972, Levers Plateau (ADW, BRI); *Coveny* 4410, 2.ix.1972, Eden Creek Falls, Toonumbar State Forest (ADW, NSW).

100. *Solanum brownii* Dunal, Hist. nat. *Solanum* (1813) 201, a new name for *Solanum violaceum* R. Br., Prodr. (1810) 445, non Ortega, Hort. Matr. Decas (1797) 56.

Type citation: "(J) v.v." J denotes Port Jackson, the area from Sydney north to Newcastle, New South Wales.

Type material: The collection at BM bears the Bennett number 2671 and "9 *Solanum violaceum* Nob. Banks of the Patersons River prodr 445 Octr. 1804", and is here proposed as lectotype; there is an isotype of this at K.

Solanum violaceum R. Br. var. *scabrum* Benth., Fl. Austral. 4 (1868) 452.

Type citation: "N.S. Wales, Vicary, C. Moore".

Type material: (1) K, (2) not traced.

Solanum violaceum R. Br. var. *variegata* R.T. Bak., Proc. Linn. Soc. NSW 21 (1896) 458.

Type citation: "Growing between bark and sapwood of *Angophora intermedia* on the Gulf road".

Holotype: not traced.

Solanum violaceum R. Br. var. *album* Maiden & Betche, Proc. Linn. Soc. NSW 29 (1904) 747.

Type citation: "(1) Mt. Dangar, Gungal, near Merriwa, also (2) Wallsend (Both J.L. Boorman Sept. 1904)".

Type material: (1) NSW (2) not traced.

Solanum curvipes Domin, Feddes Repert. 12 (1913) 131.

Type citation: "New South Wales: [1] leg. Clowes (sine statione accuratus indicata); [2] banks of the Nepean River, leg?; [3] Hastings River, leg. C. Moore (a shrub 10 ft high); [4] Clarence River, leg. Beckler (f. *curvispina*, caulibus spinis subrecurvatis armatis excellens)".

Type citation: 1-4, K; 1, 2 & 4, photos ADW.

Solanum curvicauspe Domin. forma *curvispina* Domin l.c.

Type citation: "Clarence River, leg. Beckler".

Type material: K and photo ADW.

Solanum violaceum R. Br. forma *scabrum* (Benth.) Domin, Biblioth. Bot. 89 (1929) 1136, based on *S. violaceum* var. *scabrum* Benth.



Fig. 110. *Solanum brownii* Dunal. Drawn from herbarium specimen collected by E. Gauba, from Sugarloaf Mountain, Braidwood district, NSW (ADW 38672). $\times \frac{2}{3}$.

Literature

As *S. brownii* Dunal: Dunal (1813) 201; Poiret (1814) 769; Dunal (1816) 35; Don (1837) 430; Walpers (1844) 78.

As *S. violaceum* R. Br.: Brown (1810) 445; Dunal (1816) 44; Dunal in DC (1852) 336; Miquel (1857) 652; Benthams (1868) 452; Mueller (1881-82) 795; Mueller (1882a) 96; Bailey (1883) 344; Moore (1893) 333; Baker (1896) 458; Maiden (1898a) 24; Bailey (1901) 1084; Maiden & Betche (1904) 747-48; Dixon (1906) 222; Bailey (1913) 354; Maiden & Betche (1916) 181; Ewart & Tovey (1920) 204; Domin (1929) 1136; Ewart (1931) 1004; Burbidge & Gray (1970) 320; Willis (1972) 552.

A variable erect *shrub* 0.5-2 m tall, becoming woody below; prickles to 1 cm long, firm, straight, usually sparse and confined to stem, occasional on upper or lower leaf surfaces, rare on peduncle and calyx, some plants unarmed; plants with stellate hairs; upper leaf surface dark green, sparsely pubescent (sessile porrect-stellate with medium central ray), lower surface densely woolly-pubescent with pale or rusty hairs (multiseriate-stalked, porrect-stellate with long central ray); leaves markedly discolorous. Lower juvenile *leaves* to 10 x 4 cm, entire or shallowly lobed, adult leaves (4-) 7 (-10) x (0.8-) 1.5 (-2.5) cm, lanceolate, entire or with sinuate margin, veins conspicuous above and below, apex acute to acuminate, base cuneate, rounded to cordate, mostly oblique; petiole (0.5-) 1 (-2) cm long. *Inflorescence* a few- to 10-flowered cyme in an extra-axillary position; peduncle to 1 cm long, short or absent; floral rhachis 1-2 cm long; pedicel c. 1 cm long, rather thick, woolly. *Calyx* tube 3-4 mm long; lobes short, triangular, acumens 1-2 mm long. *Corolla* 2.5-4 cm diam., broadly stellate to rotate, interacuminal tissue well developed, exceeding acumen, petal thus appearing emarginate, showy, pale blue, heliotrope or rich purple. *Filaments* (Fig. 166) 2 mm long; anthers 5-6 mm long, oblong, relatively stout. *Ovary* glandular, stellate-pubescent towards summit; style 1 cm long, slightly sigmoid, pubescent towards base; stigma capitate. *Berry* (Fig. 155) 1.5-2 cm diam., relatively large, globular, there are a few specimens of berries and little information on their ripe state; Willis (1972:552) describes them as yellow, Rodd, on a collection from Mt Yengo, NSW 90114, describes them as greenish-white; on an anomalous collection, *McBarron 14786* from Yellow Rock, Albion Park, described as white and juicy when mature. *Seeds* (from the McBarron collection) 2.5-3.5 mm long, flattened, minutely reticulate, numerous. (Fig. 110.)

Chromosome number: unknown.

Notes

S. brownii becomes increasingly variable in the northern parts of its range and there approaches *S. cinereum* in leaf lobing and armament. However, the calyces do not appear to be as prickly as those of *S. cinereum*. It would seem to be most closely related to *S. cinereum* with a rather similar distribution but on the western slopes of the Ranges. *S. cinereum* has dark seeds, but I do not know the colour of the mature seeds of *S. brownii*.

Distribution and habitat (Map 11)

N.S.W.: Along most of the Great Dividing Range system from near the Qld border to extreme eastern Vic. It has been collected from thick brush, tall eucalypt forest, from creek banks, fire tracks, roadsides, rocky slopes on soils derived from both sandstones and basalts.

Selected specimens (total seen about 125)

QUEENSLAND: *Carroll 782*, 17.v.1967, Mt Cordeaux, Cunningham Gap (ADW, CBG).

NEW SOUTH WALES: *Pickard & Coveny 1215*, 10.vi.1969, Turrell Crk, WNW of Scone (ADW, NSW); *Burgess 11*, Aug. 1970, Owens Gap, W of Scone (ADW, CBG); *Johnson s.n.*, 19.ix.1951, Honeysuckle Crk (ADW, NSW); *Boorman s.n.*, June 1907, Gunnedah (ADW, NSW).

VICTORIA: *Robbins s.n.*, Oct. 1937, Mt Drummer (ADW, MEL).

Section 20. *Micracantha* Dunal, Hist. nat. *Solanum* (1813) 128, 193.

Type species: S. micracanthos Lamk.

The species of this section are found in Central and South America except for *S. hamulosum* and *S. dimorphispinum*.

Sprawling or climbing shrubs, stems, petioles and often lower midvein of leaf with hooked prickles, simple acicular prickles may also occur on the leaf blade. The tomentum is of stellate hairs, often minute, often sparse on the upper leaf surface. The leaves are angularly lobed, often geminate and relatively large. The inflorescence is a condensed cyme with relatively few flowers. The corolla is broadly stellate, the anthers lanceolate opening by terminal pores and the berry relatively large, succulent, and orange-red in colour.

S. hamulosum and *S. dimorphispinum* are certainly somewhat discordant amongst the rest of the Australian species. Their limited distribution in Qld make me suspicious that they too may be early introductions to Australia from the Americas although they have not been identified with American species.

101. *Solanum dimorphispinum* C.T. White, Proc. R. Soc. Qld 50 (1939) 82.

Type citation: "Mount Spurgeon, common along tracks and on the edge of clearings in rainforest, C.T. White, No. 10619 (flowering specimens) September 1936, (large straggling bushes 3-4 m high, flowers mauve)."

Holotype: BRI 10416-10417 two sheets.

An erect or sprawling *shrub* to 4 m tall (5 m Hyland), not known to be clonal; prickles 5-7 mm long, scattered on upper and lower surfaces of younger leaves, straight, pale, few or absent on mature leaves; prickles on stems 2-4 mm long, stout and hooked, persistent; all parts with tomentum of close minute stellate hairs (mostly sessile, porrect-stellate hairs with short central ray), minute, simple, glandular hairs also occur, dense below, sparse and scattered on upper leaf surface, general aspect green or grey-green, leaves markedly discolourous. Juvenile *leaves* to 25 x 20 cm, ovate, with 9-10 main lobes, lobes cut $\frac{1}{3}$ - $\frac{1}{4}$ of way to midrib, themselves bearing 1-2 shallow, broadly triangular lobes, sinuses rounded, leaf and lobe apices rounded or acute, leaf base cordate, equal, mature leaves 7-13 x 4-8 cm, ovate to elliptic, entire or with to 9 shallow, rounded lobes, sinuses broad and shallow, leaf apex acute or acuminate, leaf base rounded, oblique; petiole 1-4 cm long, with or without few hooked spines. *Inflorescence* a congested cyme of to 10 flowers in an extra-axillary position; peduncle to 1 cm long; floral rhachis to 1 cm long; pedicel 1-2 cm long, slender. *Calyx* tube 2-3 mm long; lobes 2-3 mm long, elliptic, lobe apex acute. *Corolla* 3-4 cm diam., stellate, lobes deeply separated, elliptic, mauve, strongly reflexed. *Filaments* (Fig. 165) short; anthers 7-8 mm long, linear-lanceolate, loosely erect. *Ovary* 1-2 mm long; style 1 cm long, erect; stigma terminal; ovary and style pubescent with stellate hairs. Fruiting pedicel 2-4 cm long, slightly thickened upwards and deeply grooved towards summit; calyx little enlarged; *berry* (Fig. 156) to 2 cm diam., succulent, first green, ripe colour not stated. *Seeds* 2.5 mm long, flattened, pale or light-brown, 68, 121, 156 seeds in three fruits counted. (Fig. 111.)

Chromosome number: $n = 12$ Randell & Symon (1976); in addition Hyland 7205 has also been counted by Randell, $n = 12$.

Notes

S. dimorphispinum and *S. hamulosum* are a closely related pair of species which differ little morphologically but differ substantially in their alkaloid content (Bradley et al., 1978, 1979).

Distribution and habitat (Map 12)

Qld in the vicinity of Mossman north of Cairns, along road edges and rainforest margins.

Selected specimens (total seen about 15)

QUEENSLAND: *Webb & Tracey* 8302, May 1969, McDowall Range (ADW, B, BIRM, CANB, K, NSW); *Webb & Tracey* 8352, Nov. 1969, Mt Lewis, SW of Mossman (ADW, B, BIRM, CANB, K); *Moriarty* 1590-1, 28.ix.1974, Mt Lewis (ADW, BRI, CANB, K, MO).



Fig. 111. *Solanum dimorphispinum* C.T. White. Drawn from field grown plant at the Waite Institute, from seed from *Webb & Tracey* 8352, collected from Mt Lewis, Qld (ADW 43089). Fruit from the original collection (ADW 37602). $\times \frac{2}{3}$.

102. *Solanum hamulosum* C.T. White, Contr. Arnold Arbor. 4 (1933) 95.

Type citation: "Boonjie, Atherton Tableland, alt. 700 m., common in rainforest, S.F. Kajewski No. 1222 (type; flowering specimens), Sept. 23."

Holotype: BRI 10420. *Isotype*: K.

Literature

White (1946b) 280.

Common name: dirran curse.



Fig. 112. *Solanum hamulosum* C.T. White. Drawn from herbarium specimen, Moriarty 1148, from Boonjie via Malanda, Qld (ADW 41578). Fruit from Hyland 7866, from Boonjie, Qld (ADW 45432). $\times \frac{2}{3}$.

A large, much-branched, scrambling *shrub* to 4 m high, not known to be clonal; prickles 2-3 mm long, stout, broadly based, strongly recurved, on stems and petioles, few or absent on mature leaves; straight prickles scattered on surface of juvenile leaves; leaves sparsely pubescent above, closely, densely, minutely pubescent below with stellate hairs (sessile or stalked, porrect-stellate generally with long central ray), slightly floccose on buds and young tips, discolorous. Juvenile *leaves* to 20 x 13 cm, broadly elliptic, with c. 11 principal broadly triangular lobes, each with 1-2 smaller shallow lobes, lobe apex acute, sinuses rounded, rarely deeper than one quarter of way to midvein, leaf base truncate, petiole 6-7 cm long; adult leaves 10-15 x 6-8 cm, ovate to ovate-elliptic, entire or repand or shallowly lobed, with short, blunt triangular lobes, base rounded, often markedly oblique; petiole 2-6 cm long. *Inflorescence* a short cyme of to 12 flowers in an extra-axillary position; peduncle 5-10 mm long; floral rhachis to 1 cm long, congested, short; pedicel 1-1.5 cm long, slender. *Calyx* tube 2 mm long, lobes to 5 mm long, sometimes several fused or the expanding corolla bursting tube. *Corolla* 1.5-3.5 cm diam., stellate, lobes divided at least $\frac{2}{3}$ of their length, often strongly reflexed, light purple, close to RHS Sea Lavender Violet 637/2. *Filaments* (Fig. 165) short; anthers c. 6 mm long, tapered, loosely erect. *Ovary* with few stellate hairs towards apex; style to 1 cm long, erect, very slightly bent, pubescent below; stigma green, terminal. Fruiting pedicel to 4 cm long, slightly thickened upwards; calyx not much enlarged, *berry* (Fig. 156) 1.5-3.5 cm diam., globular, succulent. (Fig. 112.)

Chromosome number: unknown.

Notes

Material is inadequate to assess variability in this species, but juvenile leaves are larger, more lobed and more prickly than later ones. The species is very closely related to *S. dimorphispinum* from which it differs in chemical composition Bradley et al (1978) and in minor technical details, the two species being otherwise difficult to distinguish. They do not have close relatives amongst the Australian species. I would not be surprised if they were in fact aliens.

Distribution and habitat (Map 5)

Qld in disturbed sites in rainforest of the Atherton tableland.

Selected specimens (total seen about 12)

QUEENSLAND: *Symon* 4750, 17.v.1967, near Boonjie, Atherton Tableland (ADW, BRI, CANB, K); *Hyland* 7757, 7772, 11.x.1974, Bellenden Ker Range (ADW, BRI, CANB).

Section 21. *Campanulata* Symon, sect. nov.

Frutex, stellatis pilis saepe glanduliferis tomentosus; *corolla* profunde campanulata; flores superiores masculi, flores inferiores hermaphroditi; *bacca* in calyce partim inclusa; semina nigra.

Typus: *S. campanulatum* R. Br.

Shrub; tomentum of stellate hairs often gland tipped; corolla deeply campanulate; anthers lanceolate, opening by terminal pores; upper flowers male, lower flowers hermaphrodite; berry partly enclosed in calyx, firm-fleshed, yellowish; seeds black.

This new section is named to accommodate the distinctive species *S. campanulatum* R. Br. Seithe (1962) included this species in section *Protocryptocarpum* Bitt. ex Marzell of which the type species is *S. sisymbriifolium* Lamk. However, *S. campanulatum* differs from this in many characters, e.g. the leaves are not deeply lobed, the corolla is deeply campanulate, the fruits are yellow and mucilaginous rather than red and pulpy and the seeds are black.

103. *Solanum campanulatum* R. Br., Prodr. (1810) 446.

Type citation: "(J.) v.v." J denotes Port Jackson, the area from Sydney north to Newcastle, New South Wales.

Type material: The collection at BM bears the Bennett number 2680 and '18 *Solanum campanulatum* prodr 446 Banks of the R. Grose 1803-5" and is selected here as the lectotype. There is an isoelectotype of this at K, MEL, and possibly MPU where the labelling simply states "Nouv. Hollande Mr. R. Brown 1819".



Fig. 113. *Solanum campanulatum* R. Br. Drawn from field grown plant at the Waite Institute, from seed from *Whitehead s.n.*, collected at Budgewoi, NSW (ADW 31608). $\times 2/3$.

Literature

Brown (1810) 446; Dunal (1813) 223; Poiret (1814) 778; Dunal (1816) 42; Don (1837) 436; Jackson (1838) t. 3672; Walpers (1844) 87; Dunal in DC. (1852) 297; Bentham (1868) 460; Mueller (1868) 146; Scortechini (1881-82) 165; Mueller (1882) 96; Bailey (1883) 346; Hamilton (1887) 289; Moore (1893) 334; Baker (1896) 458; Hamilton (1899) 363; Bailey (1901) 1089; Dixon (1906) 223; Hamilton (1911) 83; Petrie (1912) 229; Bailey (1913) 357; Maiden & Betche (1916) 181; White (1937) 85; Gascoigne, Ritchie & White (1948) 44; Beadle, Evans & Carolin (1962) 401.

A soft-wooded *shrub* 0.5-1 m tall, lasting several years, not noticeably clonal; prickles to 1 cm long, unequal, straight, abundant on all parts except corolla; all parts pubescent with stellate hairs (short or long multiserial-stalked, porrect-stellate with very long often glandular central ray), also minute or long, simple uniserial glandular hairs, plants often glistening and sticky, general aspect green. *Leaves* (5-) 10 (-15) x (4-) 7 (-10) cm, ovate-elliptic, with 5-9 somewhat angular lobes, themselves with blunt lobes, sinuses blunt, shallow, 1-1.5 cm deep; leaf base oblique, apex acute; petiole 2-5 cm long. *Inflorescence* a 4-10-flowered cyme in an extra-axillary position; peduncle to 4 cm long; floral rhachis shorter; pedicels c. 2 cm long. *Calyx* tube 3-4 mm long; lobes 5-8 mm long, lanceolate, tip acuminate, midvein prominent and often armed. *Corolla* 1.5-2 cm long, deeply campanulate, lavender purple, interacuminal tissue well developed, slightly exceeding acumen which is short and acute. *Filaments* (Fig. 166) c. 2 mm long; anthers 5 mm long, oblong, stout, closely erect. *Ovary* 2 mm long, globular; style 1.5 cm long, erect, pale, tip curved; stigma terminal. Upper flowers often male, with vestigial ovary and style. Fruit half or more enclosed in enlarged prickly calyx, midnerves of lobes prominent, *berry* (Fig. 155) 2-3 x 2-2.5 cm, subglobular to obovoid, pale whitish-green to pale greenish-yellow, rather hard and firm, finally drying brown to blackish; peduncle length to first fruit (2-) 3 (-4) cm, bearing 1-2 (-6) fruits, pedicels c. 2 cm long, firm, slightly swollen above calyx, less prickly than peduncle. *Seeds* 2 mm long, almost black. *Seed* number variable, (147-) 596 (-947) in 9 fruits counted. *Cotyledons* 10-13 x 3 mm, lanceolate, minutely glandular-hairy, hypocotyl and petiole glandular-hairy, first true leaf broad ovate, weakly lobed, second leaf lobed, both prickly on midrib. (Fig. 113.)

Chromosome number: $n = 12 \text{ \& } 24$, Randell & Symon (1976).

Notes

S. campanulatum is a distinctive species with its deeply campanulate flower, large pale yellow fruits, black seeds and abundant glandular pubescence. Despite this it has been confused in particular with northern forms of *S. prinophyllum* and many of the records of *S. campanulatum* for Qld refer to that species. The species does not appear to have close relatives amongst the Australian species of *Solanum*. It is perhaps distantly related to the north western andromonoecious species with which it shares andromonoecy, relatively large fruits and dark seeds. It differs in its deeply campanulate corolla and abundant glandular tomentum. A distant relationship with *S. cinereum* is possible, this taxon having a very shallowly campanulate corolla, somewhat similar fruits with dark seeds, but differing in its scarcely glandular, markedly discoloured leaves and absence of male flowers.

Distribution and habitat (Map 7)

N.S.W. along the eastern ranges.

Selected specimens (total seen about 20)

NEW SOUTH WALES: *Whitehead s.n.*, 5.i.1964, Budgewoi (ADW) and cultivated plants to (AAU, NT); *Rodd 413*, 5.ii.1967, Culoul Range (ADW, NSW); *Burgess s.n.*, 12.viii.1969, Sandy Hollow (ADW, CBG).

Section 22. *Melongena* Dunal, Hist. nat. *Solanum* (1813) 130, 208.

Lectotype species: Melongena ovata Mill. = *S. melongena* L. (Seithe, 1962:297).

The species of this section are mostly woody shrubs and are rarely herbaceous. They are usually well armed with prickles and are pubescent with stellate hairs, sometimes glandular. The leaves are often relatively large, entire, or shallowly or deeply lobed, and mostly ovate in outline. The inflorescence consists of one or few hermaphrodite flowers below few to many male flowers; the peduncle and floral rhachis is generally unbranched. The corolla is rotate or broadly stellate, mostly purple, the anthers lanceolate, opening by small terminal pores. The ovary and style often have a few stellate or glandular hairs and the stigma is generally bilobed. The berry is globose, often yellowish, relatively large, mostly glabrous, mucilaginous and rarely pulpy. The seeds are numerous, often discoid, pale or (in Australian species) black. One species, *S. melongena*, is widely cultivated as a vegetable and several others are weedy.

There is disagreement on the delimitation of this section and I take a narrower view than D'Arcy (1973). The distribution of species of the section is from Africa, India to Australia with few, if any, species native to the Americas. However, much more needs to be done on the andromonoecious species of the Americas to clarify their relationships to the African species. A number of the species that D'Arcy includes in section *Melongena* I prefer to maintain in section *Torva*.

Bitter (1923) 157 under section *Andromonoecum* named 7 series some of which are represented by species in Australia, e.g., *S. hermanni* in series *Sodomela*, both *S. marginatum* and *S. melongena* in series *Incaniformia*. None of the indigenous Australian species have been included in any of these series. I doubt the utility of making yet more series until much more is known of the genus and comparable subgeneric taxa can be used throughout its range.

The dioecious species confined to the north-west of Australia have probably evolved from the andromonoecious and can be considered an advanced group. However, the group is discordant and andromonoecious progenitors are not obvious for all the dioecious species in Australia.

104. *Solanum cinereum* R. Br., Prodr. (1810) 446.

Type citation: "(J) v.v." J denotes Port Jackson, the area from Sydney north to Newcastle, New South Wales.

Holotype: At BM a sheet bears the Bennett No. 2678 and "16 *Solanum cinereum* prodr. 446 Banks of the Grose 1804 R.B. desc s.s."

Literature

Brown (1810) 446; Dunal (1813) 224; Poiret (1814) 778; Dunal (1816) 43; Don (1837) 436; Walpers (1844) 87; Dunal in DC. (1852) 294; Benth (1868) 460; Mueller (1882) 96; Bailey (1883) 347; Hamilton (1887) 289; Baker (1896) 458, (1899) 625; Moore (1893) 334; Bailey (1901) 1090; Dixon (1906) 223; Maiden (1908) 70; Black (1909) 114; Cambage (1911) 549; Cheel (1911) 158; Bailey (1913) 357; Maiden (1915) 981, (1917) 653; Black (1916) 56; Maiden & Betche (1916) 181; White (1920) 29; Dodd (1922) 153; Dodd (1923) 257; Brough, McLuckie & Petrie (1924) 487; Black (1926) 498; Seddon (1930a) 641; Seddon (1930) 418; White (1937) 230; Hurst (1942) 368; Webb (1948) 158; Whittet (1958) 357; Shaw et al (1959) 179; Beadle, Evans & Carolin (1962) 401; Aurich (1966) 447; Burbidge & Gray (1970) 322; Willis (1972) 553; Everist (1974) 466; Symon (1976) 28-29.

Common name: narrawa burr.

An erect or bushy clonal *shrub* 0.5-1 m tall, herbaceous or stems lasting several years; prickles to 15 mm long, usually straight, abundant on stems, petioles, upper and lower leaf surfaces, peduncles, pedicels and calyx; stems and lower leaf surface closely and densely pubescent with pale stellate hairs (sessile or short multiserial-stalked,

porrect-stellate with short or medium central ray), also minute, simple, glandular hairs, upper leaf surface sparsely pubescent with minute hairs mostly concentrated along veins, general aspect dark green, leaves markedly discolorous. *Leaves* (4-) 6 (-12) x (2-) 3 (-7) cm, ovate-elliptic, deeply lobed with 5-10 main lobes, lobes with slightly lobed or undulate margins, sinuses rounded and cut about half way to midrib, leaf base markedly oblique, apex acute; petiole 0.5-1.5 (-4) cm long. *Inflorescence* a few to 6-7-flowered



Fig. 114. *Solanum cinereum* R. Br. Drawn from field grown plant at the Waite Institute, from seed from Symon 3452, collected at Mambray Creek, SA (ADW 32980). $\times \frac{2}{3}$.

cyme in an extra-axillary position; peduncle 2-10 mm long; floral rhachis to 6 cm long, upper flowers sometimes male; pedicel 5-8 mm long. *Calyx* tube 2-3 mm long; lobes linear, 3-5 mm long, all very prickly outside, prickles to 8 mm long. *Corolla* 1.5-2 cm long, campanulate-rotate, mauve-purple, interacuminal tissue well developed, hardly exceeding petal tips. *Filaments* (Fig. 166) 2-3 mm long; anthers 3-4 mm long, oblong, stout, loosely erect. *Ovary* 1-1.5 mm long, glabrous; style c. 1 cm long, curved; stigma shortly two lobed. Fruiting peduncles and pedicels often firm, stout and decurved in fruit; calyx 1 cm long, appressed to fruit, tip acuminate; *berry* (Fig. 155) globular, 1.5-2 cm diam., first marbled green, later greenish-ivory, finally dark brown with firm papery skin, seeds adherent to placenta in a mass. *Seeds* 3-4 x 2-3 mm, flattened or slightly twisted, notched at hilum, dark brown. A single count of 384 seeds in one fruit was made. *Cotyledons* c. 18 x 7 mm, lanceolate, first true leaf c. 21 x 14 mm, oval-ovate, with 1-2 prickles at the base of upper leaf surface, second true leaf c. 8-15 mm long, ovate-sinuate, clearly prickly above and below, prickles developing on stem. (Fig. 114.)

Chromosome number: $n = 12$ and 24 , Randell & Symon (1976); Symon 3452 Mambray Creek $n = 24$, Symon 8013, Mt Brown $n = 12$. Unfortunately no counts of material from N.S.W. are yet available.

Notes

Evidence that *S. cinereum* was an early introduction to S.A. is convincing (Symon, 1976) and is based on the collection records. The plant is relatively large, is conspicuous in flower and fruit and is not likely to have been overlooked by early collectors. Only two collections have been found that were made before 1900 and both of these are in the vicinity of Port Augusta. In 1921 it was collected at Quorn but has not been collected further north. Between 1900 and 1960 it spread and consolidated its occurrence further south in the hilly country west of Wilmington and Melrose and in the Port Germein Gorge. As the Gorge and Mt Remarkable are localities often visited it would indeed be remarkable if the plant had been overlooked until 1922. In 1967 it was collected further south near Crystal Brook and in 1966 much further south near Lochiel. The species was probably introduced with animals or fodder during the extensive stocking of the Flinders Ranges in the early years of settlement of the State. The species is considered weedy in N.S.W. as 'Narrawa Bur' and was once listed amongst the twenty worst weeds of that State (Maiden, 1915 and 1917). However it was low on his list then and subsequent experience has shown it to be of minor importance.

S. cinereum does not appear to be closely related to other Australian species of *Solanum* except perhaps *S. brownii*. It differs from them all in its shallowly campanulate flowers and the dark parchment-like globe of the dry berry. It does not appear closely related to the north western species with dark seeds, nor to the adjacent *S. campanulatum*, from the eastern ranges of N.S.W.

Distribution and habitat (Map 9)

Western slopes of the Dividing Range from south-eastern Qld through N.S.W. to near the Vic. border. Introduced in S.A. and established in the Flinders Ranges from near Quorn to the Hummocks. Occurring in light rain forest in the north (Dorrigo) to rough pastures mainly in hilly areas and rocky slopes.

Selected specimens (total seen about 134)

QUEENSLAND: *Everist* 7136, 20.iii.1962, 6 km from Pikedale on Texas Road (ADW, BRI, K).

NEW SOUTH WALES: *McKee* 9632, 27.x.1962, Queanbeyan (ADW, CANB, K); *Constable* s.n., 23.viii.1950, Ponto, 3 km W of Geurie (K, NSW).

SOUTH AUSTRALIA: *Shillabeer* s.n., 1.x.1960, Alligator Creek (AD, BM, P); Symon 8013, 16.ix.1972, E slopes of Mt Brown (AD, ADW, CANB, MO).

*105. *Solanum marginatum* L. f., Suppl. (1781) 147.

Type citation: "Habitat in Abyssinia".

Type material: Not seen.



Fig. 115. *Solanum marginatum* L.f. Drawn from plant, Symon 8806, from Willunga, SA (ADW 45454). $\times 2/3$.

Literature

Dunal (1813) 93, 215; Poiret (1814) 743; Dunal (1816) 40; Sims (1817) t. 1928; Don (1837) 434; Walpers (1844) 84; Dunal in DC. (1852) 370; Bitter (1917a) 7-12; Black (1917) 50; Bitter (1923) 287; Standley (1924) 1300; Black (1926) 495; Vilmorin & Simonet (1927) 164; Ewart (1931) 1002; Allan (1940) 196; Elmer (1943) 162; Briggs (1952) 3587; Curtis (1967) 506; Krishnappa (1968) 163-173; Madhavadian (1968) 343; Willis (1972) 553.

Common name: white edge nightshade.

A sparingly clonal *shrub* to 1.5 m tall; prickles to 1 cm long, straight, present on stem, petiole, upper and lower leaf surfaces and on calyx of hermaphrodite flowers; stems and lower sides of leaves with tomentum of close, dense, minute, silvery-stellate hairs (sessile or multiseriate-stalked, porrect-stellate), sparse on upper surface except for margin of leaf where a distinct band persists. *Leaves* c. 12 x 8 cm, oval, with 7-11 rounded lobes, their apices rounded or obtuse, sinuses shallow and rounded, leaf margins somewhat sinuate-crenate, lower surface densely white tomentose, upper surface dull green except for a distinct, pale tomentose edge, leaf base unequal or auriculate cordate; petiole 2-2.5 cm long, densely white-tomentose, usually bearing a few prickles. *Inflorescence* a short supra-axillary cyme of 1-5 hermaphrodite flowers with as many male flowers above. *Hermaphrodite flowers* with pedicels 2-2.5 cm long, more stout and prickly. *Calyx* prickly; lobes 5-10 x 3-5 mm, almost leafy, unequal, veins prominent. *Corolla* 3-4 cm long, rotate, white or very pale mauve, stellate pubescent within and without. *Anthers* (Fig. 166) sessile or nearly so, stout, c. 7 mm long, yellow. *Ovary* densely white-stellate pubescent; style c. 1 cm long, densely pubescent; stigma green, 3-lobed. *Male flowers* similar, usually slightly smaller. *Calyx* lobes less well developed, with fewer or no prickles. *Ovary* lacking. *Fruits* (Fig. 158) solitary or few together, globular, 3-4 cm diam., on strong, stout, deflexed pedicels 2.5 cm long, 5-6 mm thick just above calyx; calyx lobes not appressed nor greatly enlarged, berry first marbled green and white, later pale to deep yellow (close to Straw Yellow RHS 604), skin rather thick, flesh greenish. *Seeds* 2-2.5 mm long, thick, flattish, light brown, with fine granular surface, 500-900 per fruit. (Fig. 115.)

Chromosome number: $n = 12$ Randell & Symon (1976).

Notes

This species with its handsome leaves has been grown as an ornamental.

Distribution and habitat (Map 1)

Originally from north east Africa (Eritrea, Ethiopia) it is now sparingly naturalised in the southern States of Australia.

Selected specimens (total seen about 25)

NEW SOUTH WALES: *Boorman s.n.*, 1916, cult. Sydney (NSW).

VICTORIA: *Shire Engineer* 1883, S of Colac (MEL, L); *Baker s.n.*, 1919, Merino district (MEL).

TASMANIA: *Spicer s.n.*, Dec. 1875, Royal Society Garden ?Hobart (HO); *Buften s.n.*, 1892, Pt Arthur (MEL); *Curtis s.n.*, Oct. 1947, Bellerive (HO); *Morris s.n.*, 4.iv.1978, Moonah, domestic garden, open shrub 2.5 m (HO).

SOUTH AUSTRALIA: *Agric. Bur.*, 1911, Morphett Vale; *Symon* 8806, 5.v.1974, Willunga (ADW, BRI, CANB, MO, NSW).

*106. *Solanum melongena* L., Sp. Pl. 1 (1753) 186.

Type material: Not seen, D'Arcy (1974) gives Herb. Linn. 248.28 (LINN); Microfiche AD!

Literature

Poiret (1814) 742; Walpers (1844) 81; Don (1837) 432; Nees (1837) 48; Dunal in DC. (1852) 355 as *esculentum*; Sendtner (1856) 77; Clarke (1883) 235; Mueller (1888) 398; Bitter (1919) 88; Bitter (1923) 292; Filov (1940) 815; Podjarkova (1955) 39; Heine (1963) 332; Backer & Bakhuizen (1965) 474; Smith & Downs (1966) 185; D'Arcy (1974) 852; Gentry & Standley (1974) 127; Heine (1976) 152.

Common name: eggplant, aubergine, brinjal.

An annual *herb* or short-lived soft-wooded *shrub* to 1 m tall, cultivated for its large edible fruit; cultivated forms lack prickles (except for a few soft ones on calyx), elsewhere forms with prickles occur; all parts sparsely or densely pubescent with stellate hairs (sessile or stalked pectinate-stellate), glandular hairs not obvious, aspect grey or



Fig. 116. *Solanum melongena* L. Drawn from plant cultivated at Zenag, Papua New Guinea (no voucher). $\times \frac{2}{3}$.

purplish-green. *Leaves* to 20 x 10 cm, ovate or ovate-oblong, entire or with 5-9 shallow sinuate lobes, lobes and sinuses rounded, base unequal, petiole 2-8 cm long. *Inflor-escence* a single, large, hermaphrodite flower below a short raceme of few, smaller, male flowers; in domesticated plants male flowers may be lacking on some or all inflor-escences; flowers frequently multi-partite with 5-7 lobes and anthers. *Hermaphrodite flower*: pedicel 1.5-3 cm long, relatively stout, soon deflexed. *Calyx* tube 5 mm long; lobes 1-1.5 cm long, oblong-lanceolate, tapering into acumens 3-5 mm long, with a few soft prickles. *Corolla* 3-4 cm diam., broadly stellate. *Filaments* (Fig. 166) 3-4 mm long; anthers 5-7 mm long, oblong, stout, erect. *Ovary* pubescent at summit with stellate hairs; style 1-1.5 cm long, erect, stout; stigma terminal. *Male flower*: peduncle 2-4 cm long with 1-5 flowers; pedicel 1-1.5 cm long, slender. *Calyx* tube to 5 mm long; lobes 5-8 mm long, triangular. *Corolla* 3-3.5 cm diam., broadly stellate. *Filaments* 2-3 mm long; anthers 5-6 mm long, oblong, erect. *Ovary*, style and stigma vestigial or absent. Fruiting pedicel massive, deflexed, *berry* 10-20 cm long, globose, obovate or oblong, glabrous, usually dark shining-purple, pale forms are known, flesh pale. *Seeds* 3-4 mm long, numerous, flattened, subreniform, pale yellow to light brown. (Fig. 116.)

Chromosome number: $n = 12, 18, 24$ Fedorov (1969).

Notes

No attempt will be made here to cover the horticultural aspects of this species. It was probably first domesticated in India and is now grown as a vegetable in most of the warmer areas of the world. A great many cultivars have been developed varying in maturity, size, shape and colour of the fruit.

Distribution

Widely cultivated as a vegetable it is not known to be naturalised in Australia.

Selected specimen

NEW SOUTH WALES: *Morris s.n.*, 30.i.1932, Broken Hill (ADW).

SOUTH AUSTRALIA: *Symon 4718*, 30.iii.1967, cult. Tusmore (AD, ADW).

*107. *Solanum hermanni* Dunal, Hist. nat. *Solanum* (1813) 212, t. 2, fig. b.

Type citation: "Hab. in promontorio Bonae-spei; Herm. in Nova Hollandia, ubi e Brasilia vel prom. Bonae-spei forsan introductum. Brown l.c. (v.v.h.m.)".

Type material: Hepper (1978) cites "Cape of Good Hope, Breyne, Fasc. 25, Hermann, Florae lugduno-batavae flores, t. 474 (1687)", not traced.

S. sodomium auctt. non. L. For discussion of this unfortunate name change see Hepper (1978).

Literature

All these references are to *S. sodomium* auctt. pl. non L.

Brown (1810) 446; Dunal (1813) 213; Poiret (1814) 742; Don (1837) 433; Walpers (1844) 82; Dunal in DC. (1852) 366; Sendtner in Martius (1856) 76; Bentham (1868) 458; Bailey & Tenison-Woods (1879-80) 171-172; Bailey (1879-80) 31; Bailey (1881) 3; Bailey (1883) 346; Wootts (1884-85) 201; Turner (1890) 306; Turner (1891) 124; Bailey (1901) 1088; Bailey (1906) 121; Black (1909) 113; Ewart (1909) 44; Maiden (1909) 1012; Bailey (1913) 357; Hamilton (1917) 287; Bitter (1917a) 7-12; Bitter (1923) 158; Gardner (1924-25) 69; Black (1926) 498; Carne & Gardner (1926) 176-177; Domin (1929) 1139; Carey (1930) 737; Ewart (1931) 1005; Clarke (1934) 1015-1019; Allan (1940) 196; Hurst (1942) 374; Webb (1948) 160; Winders (1948) 198; Clark (1949) 7; Easterbrook (1950) 271-273; Bianchi (1951) 179; Connor (1951) 96; Hall (1953) 156; Gardner & Bennetts (1956) 164; Whittet (1958) 360; Lawrence (1960) 34; Beadle (1962) 402; Kingsbury (1964) 292; Ooststroom & Reichgelt (1966) 167; Chandra (1967) 227-229; Ross (1971) 870-873; Willis (1972) 554; Parsons (1973) 273-275; Everist (1974) 477; Grieve & Blackall (1975) 601; Hepper (1978) 292.

Common name: apple of Sodom.

An often rounded woody *shrub* to 1 m high and slightly broader; stems, petioles, leaves (upper and lower surfaces) pedicels and calyces with prominent, stout, straw-coloured prickles to 15 mm long, more or less straight, with tomentum of stellate hairs, (sessile or multiseriate-stalked, porrect-stellate with short or long central ray), also minute, simple, glandular hairs, sparse above, dense below; aspect dark green, concolorous. *Leaves* to 8 x 6 cm, oval, deeply pinnately lobed, sinuses rounded, reaching three-quarters of way to midrib, commonly 5-7 major lobes, tips rounded or



Fig. 117. *Solanum hermanni* Dunal. Drawn from herbarium specimen of plant grown at the Waite Institute, from seed from Cape Leeuwin, WA (ADW 39288). Fruit from Robe township outskirts, SA (ADW 40355). $\times \frac{2}{3}$.

obtuse, larger lobes with sinuate margins; petiole 1-2 cm long. *Inflorescence* a stout raceme from an internodal position bearing few to six purple-blue flowers, occasionally the lower flower appearing solitary; peduncle stout, short or absent; pedicels c. 1 cm long, densely prickly. *Calyx* densely prickly; tube c. 5 mm long; lobes 2-3 mm long, triangular, acute. *Corolla* 2 cm diam., rotate-stellate; lobes acute, pale purple with darker streak towards base, sparsely pubescent outside. *Filaments* (Fig. 166) 1-2 mm long; anthers 5-6 mm long, erect, oblong, tapering upwards. *Ovary* glabrous or with few glandular hairs; style c. 1 cm long, sparsely stellate-pubescent; stigma capitate, green, slightly bilobed. Fruiting pedicel thickened and recurved; calyx somewhat enlarged, appressed, very prickly; *berry* (Fig. 158) 2-3 cm diam., globular, first marbled green, later yellow, finally brownish to blackish, dry when mature. *Seeds* numerous, 100-200 per fruit, 2-3 mm long, rounded or obovate, biconvex, light brown or mustard coloured, minutely tuberculate all over. *Cotyledons* broad-lanceolate, 2 x 0.7 cm, petiole 3 mm long, first true leaves orbicular-ovate, scarcely repand, scarcely prickly. (Fig. 117.)

Chromosome number: $n = 12$ Randell & Symon (1976) and, in addition, plants grown from Cape Leeuwin and Indooroopilly have also had $n = 12$.

Note

This species was one of the first alien solanums recorded in Australia and was collected at Port Jackson in 1801. Although it has been declared noxious in some States it rarely assumes serious proportions as a weed. It differs from the native Australian *Solanum* of section *Melongenae* in usually having several hermaphrodite flowers per cyme and having few male flowers above. All the Australian representatives have a solitary hermaphrodite flower and many male flowers. It is more closely related to *S. marginatum* which is also from Africa.

Distribution and habitat (Map 11)

All States except N.T. and Tas. Widely established in waste places and rough pastures, roadsides, often sub-coastal and often in soils over limestone.

Selected specimens (total seen about 100)

WESTERN AUSTRALIA: *Cronin s.n.*, 1889, Upper Blackwood River (MEL); *Beaglehole 12487*, 7.ix.1965, Cape Leeuwin (ach, ADW).

QUEENSLAND: *Bailey s.n.*, Brisbane (BRI); *Everist 402*, 22.viii.1933, Caloundra (BRI).

NEW SOUTH WALES: *Baudin s.n.*, 1801, Pt Jackson (P); *Tilden 554*, Sept. 1912, Bondi Bay (BM, K, E).

VICTORIA: *Anon s.n.*, 1852, Plenty Creek (MEL); *Morrison s.n.*, 14.iii.1886, Brighton (BM, E, K).

SOUTH AUSTRALIA: *Tepper s.n.*, 1880, Ardrossan (MEL); *Wilson 1188*, 13.xi.1959, Lake Bonney (AD, CHR, E).

108. *Solanum beagleholei* Symon, sp. nov.

Frutex 0.5-1.5 m, erectus, effusus et clonalis. Partes omnes pilis stellatis pallidis dense pubescentes, adpectu generali cinereo usque flavo-virente concolori. *Aculei* usque 6 mm, inaequales, tenues, recti, pallidi in caule petiolo pedicello fructifero et calyce copiosi, utrinque in pagina folii pauci vel nulli. *Folia* 6-8 x 3-4 cm, integra, ovata usque ovato-lanceolata; apex obtusus vel acutus; basis cuneata usque rotundata, obliqua; petiolus 1-1.5 cm, pro ratione crassus. *Inflorescentia* e flore hermaphrodito infra cymam florum masculorum sistentes; pedunculus communis c. 1 cm. Flos hermaphroditus: pedicellus 1-1.5 cm aculeatus, tubus calycis 4-6 mm aculeatus; lobi calycis 5-8 mm, lanceolati, aculeati. *Corolla* 3.5-4 cm diametro, late stellata, purpurea; filamenta 2-3 mm; anthera 7-8 mm valde lanceolatae; ovarium 2-3 mm, obtuse conicum; stylus 10-12 mm, apice flexus; stigma terminale breviter bilobum. Flos masculinus similis sed minor, calyx inermis; ovarium, et stylus et stigma vestigiale. Pedicellus fructifer c. 3.5 cm, deflexus, firmus, aculeus; calyx adpressus, lobis c. 1 cm, late triangularibus; bacca c. 3 cm diam., globosa, initio viridi-pallida, demum flava. *Semina* 2.5-3 mm, nigra, manifeste minute reticulata.

Typus: D.E. Symon 5300, 23.vi.1967. On dry dissected rocky sites above Geikie Gorge, Fitzroy River, Western Australia. ADW 33147 (holotypus), B, K, NSW, PERTH, US. (Fig. 118.)



Fig. 118. Holotype of *Solanum beaugleholei* Symon (Symon 5300, ADW).

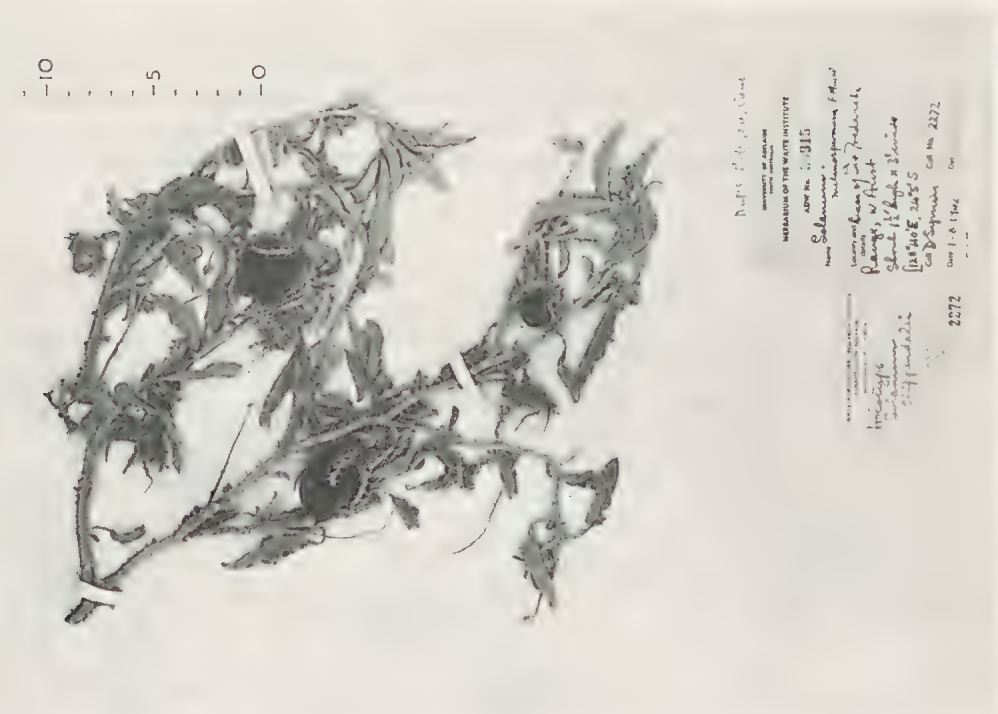


Fig. 119. Holotype of *Solanum chippendalei* Symon (Symon 2272, ADW).

An erect, straggly, sparingly clonal *shrub* 0.5-1.5 m tall; prickles to 6 mm long, unequal, fine, straight, pale, abundant on stem, petiole, fruiting pedicel and calyx, less common to absent on upper and lower leaf surface; all parts densely and closely pubescent with pale stellate hairs (multiseriate-stalked, porrect-stellate with short or medium length central ray); aspect grey or yellowish-green, concolorous. *Leaves* 6-8 x 3-4 cm, entire, ovate to ovate-lanceolate, apex obtuse or acute, base cuneate to rounded,



Fig. 120. *Solanum beagleholei* Symon. Drawn from herbarium specimen, Symon 10144, collected from the King Leopold Ranges, WA (ADW 46817). Fruit from Beaglehole 53990, Fossil Downs, WA (ADW 53782). $\times 2/3$.

oblique; petiole 1-1.5 cm long, relatively thick. *Inflorescence* of one hermaphrodite flower below a cyme of male flowers; common peduncle c. 1 cm long; axis bearing male flowers to 10 (-20) cm long; floral rhachis simple or forked once or twice in well grown specimens. *Hermaphrodite flower*: pedicel 1-1.5 cm long, prickly. *Calyx* tube 4-6 mm long, prickly; lobes 5-8 mm long, lanceolate, prickly. *Corolla* 3.5-4 cm diam., broadly stellate, interacuminal tissue exceeding short acumen, thus having a 10-lobed effect; purple. *Filaments* (Fig. 167) 2-3 mm long; anthers 7-8 mm long, stoutly lanceolate. *Ovary* 2-3 mm long, bluntly conical with few sparse glandular or stellate hairs towards summit; style 10-12 mm long, bent at apex; stigma terminal, shortly bilobed. *Male flower* similar but smaller; pedicel 5-10 mm long. *Calyx* unarmed. *Corolla* to 4 cm diam. *Anthers* 6-7 mm long. *Ovary*, style and stigma vestigial. Fruiting pedicel c. 3.5 cm long, deflexed, firm, prickly; calyx appressed, lobes to 1 cm long, broad triangular; *berry* (Fig. 157) 3 cm diam., globular, first pale green, pale yellow when ripe. *Seeds* 2.5-3 mm long, black, distinctly but minutely reticulate, 481 and 780 counted in two fruits. *Cotyledon* 12-17 x 3-8 mm, lanceolate, first leaf 17 x 11 mm, ovate to broad ovate, second leaf similar, third with a few prickles, no lobing. (Fig. 120.)

Chromosome number: $n = 12$ Randell & Symon (1976), as "sp. nov. No. 2", Symon 5300, Geikie Gorge and in addition Symon 5303, 7153, 7160 have also been counted as $n = 12$ by Randell (unpublished).

Notes

Solanum beagleholei is most closely related to *S. phlomoides* and *S. chippendalei*. It may at times be difficult to separate them especially when materials are inadequate. Both *S. beagleholei* and *phlomoides* are generally larger shrubs than *S. chippendalei*. The first two taxa have entire leaves while those of *S. chippendalei* are usually sparsely or shallowly lobed and are rarely entire. The leaves of *S. beagleholei* are generally ovate but are relatively longer and narrower in *S. phlomoides* and *S. chippendalei* and are also usually smaller in the latter. The inflorescence in well grown plants of *S. beagleholei* is frequently forked once or twice which is rarely seen in the other two species. The fruits are similar in all three species. *S. beagleholei*, *phlomoides*, *chippendalei* and *melanospermum* form a quartet of species with common ancestry. The first two appear to be the more primitive in their more woody habit, larger size, larger simple leaves, and restricted distribution now separated by the sandy desert. *S. chippendalei* is more recent and has been successful in the arid interior. *S. melanospermum* has evolved on the north eastern margin in the Gulf country.

The name commemorates Mr A.C. Beaglehole of Portland, Vic. an enthusiastic collector of native plants whose private herbarium has been so readily accessible to many professional botanists.

Distribution (Map 7)

W.A. in the West Kimberly region mainly in the vicinity of the Napier and Edgar Ranges.

Selected specimens (total seen 30)

WESTERN AUSTRALIA: Symon 7153, 4.vi.1971, Winjina Gorge, Napier Range (ADW, CANB, K, PERTH); Willis s.n., 30.vii.1974, Broome Road, 44 miles W of Fitzroy River Bridge (ADW, MEL); Beaglehole 53091, 16.vi.1976, Mangel Creek—Mowla Bluff Road, 22 km S of Mowla Bluff turn-off (acb, ADW); Symon 10144, 24.v.1975, King Leopold Ranges, 16 km W of Pandanus Creek Springs and 21 km NE of Inglis Gap (ADW, CANB, K, MO, PERTH); Beaglehole 53990, 27.vi.1976, Fossil Downs—Diamond Gorge Road, 1 km NE of Fossil Downs Homestead (acb, ADW); Kenneally 5582, 11.viii.1976, Edgar Ranges survey, site D2, (ADW, PERTH).

109. *Solanum phlomoides* A. Cunn. ex. Benth., Fl. Austral. 4 (1868) 464-5.

Type citation: "N. Australia. Enderby island N.W. Coast, A. Cunningham; Hammersley Range, Maitland Brown".

Type collections: The sheet at K consists of 6 pieces with 4 labels:- (1) *Solanum phlomoides* fl. caerulea. N.W.C. 138/1st. Voy.; (2) *Solanum phlomoides* shrub 2½ ft. Enderby Isl.; (3) *Solanum phlomoides* A. Cunn. Hammersley Range, Gregory Expt. Herb. Mueller 1868; (4) *Solanum phlomoides* A. Cunn. Dampier Archipelago 138/1818 Feb., N.W. Australia, A. Cunningham.

I propose the first of these, at K, as the lectotype of which there are isoelectotypes at BM, G, MEL.

Literature

Mueller (1882) 96.

A strong growing clonal *shrub* to 2 x 2 m, trunk to 5 cm diam., lasting some years, young stems armed, old stems with corky bark; prickles to 8 mm long, unequal, straight, generally present on stems, petioles, fruiting pedicels and calyx, less common to absent on leaves and calyces of male flowers; all parts covered with dense, soft, pale tomentum of stellate hairs (short to very long multiseriate-stalked, porrect-stellate with long central cell), general aspect grey-green, leaves not markedly discoloured. *Leaves* on young or vigorous growths to 12 x 5 cm, ovate-lanceolate, entire or margin slightly repand, later leaves 4-7 x 2.5-4 cm, elliptic to ovate-elliptic, entire, apex acute, obtuse or rounded, base cuneate, oblique, veins rather impressed above, conspicuous below; petiole 1-2 cm long, relatively thick. *Inflorescence* an hermaphrodite flower below a cyme of 12-20 male flowers; common peduncle 0.5-1.5 cm long. *Hermaphrodite flower*: pedicel to 2.5 cm long. *Calyx* tube 5 mm long; lobes 1.5 cm long, triangular, with dark prickles. *Corolla* 4-5 cm diam., broadly stellate to almost rotate, deep purple. *Filaments* (Fig. 167) 1.5 mm long, anthers 7-8 mm long, lanceolate, erect in cone. *Ovary* glabrous; style to 1.5 cm long, slightly sigmoid; stigma globular, green. *Male flower*: floral rachis gradually lengthening as male flowers are produced, 1-2 at a time; pedicel c. 1 cm long. *Calyx* tube c. 3 mm long; lobes to 1 cm long, broadly lanceolate, often partially fused together, splitting unequally into 3:2 or 2:2:1 segments, without prickles. *Corolla* 3-4 cm diam., rotate, membrane well developed, slightly exceeding petal tip, filaments 1 mm long. *Anthers* 7-8 mm long, attenuate-oblong, erect in cone, deep yellow. *Ovary*, style and stigma vestigial and together 3-5 mm long. *Fruiting pedicel* 2 cm long, stout, deflexed; calyx slightly enlarged, covering base of fruit, lobes then 2-2.5 cm long, narrow-triangular, appressed or raised but not markedly reflexed; *berry* (Fig. 157) 3-4 cm diam., globular, first striped green, later yellowish, old dried fruits nearly black, retained on shrub. *Seeds* 4-5 mm long, black, minutely reticulate, 446 and 546 seeds counted in two fruits. *Cotyledon* 30 x 5 mm long, lanceolate, first leaf 22 x 15 mm, ovate, second leaf broad ovate, third leaf ovate, with a few prickles on midrib. (Fig. 121.)

Chromosome number: $n = 12$ Randell & Symon (1976); in addition Symon 5363, 5404, 5425, 10077 have also been counted as $n = 12$.

Notes

S. phlomoides is closely related to *S. beagleholei* and *S. chippendalei* and is difficult to separate from *S. beagleholei* from which it differs in its longer, narrower leaves, and from *S. chippendalei* in its greater size and shrubby habit with usually entire leaves and larger fruits. It is probable that both *S. phlomoides* and *S. beagleholei* have a common ancestry and have been separated in relatively recent times by the sandy desert extending to the north west coast. This species is one of the largest fruited Australian *Solanum*.

Distribution and habitat (Map 4)

W.A., in the Hamersley region and on some nearby islands. The species occurs on *Triodia* sand plains and at the base of rocky out-crops and in rocky gullies.



Fig. 121. *Solanum phlomoides* Benth. Drawn from pot grown plant at the Waite Institute, from Symon 5404, collected at Python Pool, at the base of Mt Herbert, 95 km south-east of Roebourne, WA (ADW 42143, fruit from ADW 39139). $\times \frac{2}{3}$.

Selected specimens (total seen about 45)

WESTERN AUSTRALIA: *Morrison s.n.*, 1.x.1905, between Globe Hill and Uaroo (E, K, PERTH); *Symon* 5363, 28.vi.1967, 10 km NE of Pardoo Stn (ADW, B, CANB, K, NSW, PERTH, US); *Symon* 5417, 1.viii.1967, 21 km S of Robe River crossing (AD, ADW, B, CANB, K, NSW, PERTH, US).

110. *Solanum chippendalei* Symon, sp. nov.

Suffrutex 0.5-1 m erectus vel effusus, versus basim lignosus. Omnes partes pilis stellatis densis pubescentes, ad aspectu generali griseoviridi, concolori. *Aculei* usque 1 cm inaequales, variabiles, plerumque in caule et pedicello et calyce obvii, in petiolo et folio rariores vel nulli. *Folia* 4-7 x 2-4 cm ambitu ovata sed variabilia et saepe asymmetrica, integra vel 5-7 lobis brevibus rotundatis, raro per dimidium spatium versus costam fissis, sinibus brevibus rotundatis; apices folii et loborum rotundati vel acuti, basis cuneata usque cordata, obliqua; petiolus 1-1.5 cm brevis, crassus. *Inflorescentia* e flore hermaphrodito infra cymam florum masculorum sistens. Flos hermaphroditus: pedicellus 1-1.5 cm aculeatus; tubus calycis 5-7 mm; dense pubescens et aculeatus; lobi calycis 1-1.5 cm lineares, sine aculeis; *corolla* circa 3 cm diametro, late stellata usque pentagonalis; filamenta 2 mm; antherae 5 mm sursum angustatae; ovarium pilis glandulosis paucis instructum; stylus 7 mm erectus. Flos masculinus: pedicellus c. 1 cm sine aculeis; tubus calycis c. 5 mm aculeis infirmis paucis vel nullis instructus; lobi 5-10 mm, anguste triangulares; *corolla* 2-2.5 cm diam., stellata-rotata, lobis obtusis; filamenta brevissima; antherae 5 mm oblongae, attenuatae; ovarium et stylus et stigma vestigiales, in toto 2 mm. Pedicellus fructifer 2.5-4.5 cm firmus, deflexus, aculeatus. Calyx auctus et basin fructus tegens, adpressus vel elevatus sed non reflexus; lobi basi 5-7 mm lati, 2.5 cm longi; *bacca* 2-3 cm diam., globosa, matura pallide flava. *Semina* 3-3.5 mm nigra, minute reticulata.

Typus: D.E. Symon 2272, 1.viii.1962. Base of the Sir Frederick Range, Western Australia. Approximate Lat. 24°5'S., Long. 128°40'E. Shrub 50 cm high and 1 m wide. ADW (holotypus), AD, CANB, PERTH. (Fig. 119.)

Literature

Carnegie (1898) 230 as *S. sodomeum*; Ewart & Davies (1917) 243 as *S. phlomoides*; Black (1938) 101 as *S. phlomoides*; Cleland & Johnson (1939a) 22 as *S. phlomoides*; Sweeney (1947) 289 as *S. eremophilum*; Cleland & Tindale (1954) 81 as *S. phlomoides*; Cleland & Tindale (1959) 123 as *S. phlomoides*; Chippendale (1960a) 202 as *S. melanospermum*; Gould (1969) 253 as *S. eremophilum*; Gould (1971) 14 as *S. eremophilum*; Chippendale (1972) 257 as *S. melanospermum*, name in list only.

An erect or spreading *subshrub* 0.5-1 m tall, woody towards base; prickles to 1 cm long, unequal, variable, usually present on stem, pedicel and calyx, rare or absent on petiole and leaf; all parts pubescent with dense tomentum of stellate hairs (short or long multiseriate-stalked, pericostate-stellate with long central ray), general aspect grey-green, concolorous. *Leaves* 4-7 x 2-4 cm, ovate, variable and often asymmetric, entire or with 5-7 shallow lobes, rarely cut half way to midvein, sinuses shallow, rounded, leaf and lobe apex rounded or acute, base cuneate to cordate, oblique; petiole 1-1.5 cm long, thick. *Inflorescence* an hermaphrodite flower below a cyme of male flowers. *Hermaphrodite flower*: pedicel 1-1.5 cm long, prickly. *Calyx* tube 5-7 mm long, densely pubescent and prickly; lobes 1-1.5 cm long, linear, without prickles or almost so. *Corolla* c. 3 cm diam., broadly stellate to pentagonal. *Filaments* (Fig. 167) 2 mm long; anthers 5 mm long, tapered upwards, firmly or loosely erect. *Ovary* with few glandular hairs; style 7 mm long, erect, bent at tip. *Male flower*: pedicel 1 cm long, without prickles. *Calyx* tube c. 5 mm long, with or without a few weak prickles; lobes 5-10 mm long, narrow triangular. *Corolla* 2-2.5 cm diam., stellate-rotate, lobes blunt. *Filaments* very short; anthers 5 mm long, loosely erect, attenuate-oblong. *Ovary*, style and stigma vestigial together c. 2 mm long. Fruiting pedicel 2.5-4.5 cm long, firm, deflexed, prickly; calyx enlarged, covering base of fruit, appressed or raised or curled back; lobes 5-7 mm wide at base, 2.5 cm long; *berry* (Fig. 157) 2-3 cm diam., ovoid or globular, pale yellow when ripe. *Seeds* 3-3.5 mm long, black, minutely reticulate, seed counts ranged from 46 to 785 (a mean of 228 for 20 fruits). *Cotyledons* 17-30 x 5-7 mm, lanceolate, first leaf broad-lanceolate to ovate 15-25 x 13-17 mm, second leaf with few prickles, third leaf with cordate base and undulate margin. (Fig. 122.)

Chromosome number: $n = 12$ Randell & Symon (1976), as "sp. nov. no. 3", Symon 7638, other counts all $n = 12$ include *Maconochie* 424, *Beauglehole* 10686, Symon 5417 and Symon 7192.



Fig. 122. *Solanum chippendalei* Symon. Drawn from field grown plant at the Waite Institute, from seed from *Beauglehole* 10686, collected from the Mt Isa turnoff on the Stuart Highway, NT (ADW 41064). $\times 2/3$.

Notes

S. chippendalei is most closely related to *S. beaugleholei*, *S. phlomoides* and *S. melanospermum*. These four species occupy a geographical arc from the southern Kimberleys to the Hamersley Range and across central Australia to the south-west corner of the Gulf of Carpentaria. Of these four *S. beaugleholei* and *S. phlomoides* have the appearance of relics and *S. chippendalei* and *S. melanospermum* give evidence of being more recently evolved. *S. chippendalei* differs from *S. phlomoides* and *S. beaugleholei* in its smaller habit, generally shallowly lobed leaves, slightly smaller fruits and seeds. From *S. melanospermum* it differs in having greyish rather than rusty tomentum, globular not ovoid fruit, fewer shallow leaf lobes, shorter and stouter pedicel, and a calyx not markedly coriaceous and reflexed at maturity.

Variation in leaf lobing does occur and when unlobed the species may be difficult to distinguish from *S. phlomoides*; when deeply lobed it approaches *S. melanospermum*.

S. chippendalei is a popular and important berry in Aboriginal diet. The seeds and bitter placental centre are scraped out before the remainder of the berry is eaten, or the opened fruits may be skewered and dried. An early and interesting reference to its use (as *S. sodomeum*) is that by Carnegie (1898:230). For a recent account see Peterson (1979). The species has been referred to in literature as *S. phlomoides*, *S. melanospermum* and *S. eremophilum* and in the absence of voucher specimens it is not easy to be sure which species were in fact being referred to. The species is named after Mr G.M. Chippendale for his considerable contributions to the botany of the N.T.

Distribution (Map 12)

W.A., N.T. and Qld; in the Gibson Desert of W.A., throughout most of N.T. except the far N and the Simpson Desert and between Camowéal and Cloncurry in Qld.

Selected specimens (total seen about 80)

WESTERN AUSTRALIA: *Giles s.n.*, 1873, between Barrons and Rawlinson Range (MEL); *George 8977*, 27.vii.1967, Dovers Hill (ADW, PERTH); *Howard s.n.*, 7.vi.1968, 80 km W of Giles (ADW, CANB, PERTH); *Symon 10000* 15.v.1975, 14 km S of Kumarina (N of Meekatharra) (ADW).

NORTHERN TERRITORY: *Holtze s.n.*, 1894, Powell's Creek (MEL); *Chippendale s.n.*, 29.viii.1958, 37 km SE of Willowra Homestead (ADW, CANB, NSW, NT); *Chippendale s.n.*, 21.vi.1960, 22 km WSW of Soudan (ADW, CANB, NSW, NT); *Lazarides 6001*, 16.ix.1961, 34 km SW of Napperby Stn (BRI, CANB, K, NSW); *Nelson 1698*, 16.v.1968, 24 km N of Alice Springs (ADW, NT, PERTH); *Latz 492*, 21.ii.1969, 6 km N of Barrow Creek (ADW, K, NT); *Symon 6895*, 16.v.1971, 108 km NW of Yuendumu (near Chilla Well) (ADW, CANB, K, NT).

QUEENSLAND: *Gittens 716*, May 1963, 3 km N of Selwyn (BRI, K, NSW); *Pedley 2000*, 26.v.1966, 113 km W of Winton on Boulia Road (BRI, K); *Swan 118*, Aug. 1974, side road off Mt Isa-Cloncurry Road at point 59 km E of Mt Isa (ADW).

111. *Solanum melanospermum* F. Muell., *Fragm.* 2 (1861) 163.

Type citation: "Ad ripas fluminis Abel Tasman's River".

Type material: The sheet MEL 12085 bears the labels "*Solanum melanospermum* F.M. Gulf of Carpentaria" and "*Solanum melanospermum* . . . 3-4" plus a note by Mr R.V. Smith suggesting that the Gregory Expedition was in fact on the Robinson River and not the Abel Tasman. This is selected here as the lectotype. An isolectotype at K bears the label "*Solanum melanospermum* Ferd. Mueller, Abel Tasman River Dr. M".

Literature

Mueller (1861) 163; Bentham (1868) 462; Mueller (1882) 96; Ewart & Davies (1917) 243.

An erect open *shrub* 1-1.5 m high and wide, woody below; stems lasting several years, not known to be clonal; prickles to 5 mm long, pale or reddish, sparse on stem, absent on petiole, conspicuous on fruiting calyx; all parts pubescent with close, dense,

often rusty stellate hairs, (sessile to long multiseriate-stalked, porrect-stellate with long central ray); general aspect rusty-green; leaves not markedly discoloured. Juvenile leaves to 15 x 10 cm, ovate, with about 7 lobes, lobes broadly triangular to oblong, margins entire or shallowly undulate; sinuses rounded and cut halfway to midvein, leaf and lobe



Fig. 123. *Solanum melanospermum* F. Muell. Drawn from pot grown plant at the Waite Institute, from seed from Symon 5064, collected 32 km north-west of the Robinson River Headstation, NT (ADW 33025). $\times \frac{2}{3}$.

apices rounded or acute, leaf base shortly cuneate to truncate; petiole 4-7 cm long. *Adult leaves* 4-7 x 1.5-4 cm, ovate-lanceolate, with several shallow lobes towards base, lobing sometimes unequal, sinuses shallow and rounded, lobe and leaf apex rounded or acute, base broad-cuneate, very oblique; petiole 1-1.5 cm long. *Inflorescence* a single hermaphrodite flower below and adjacent to an erect cyme of male flowers; common peduncle absent or very short in the few collections seen. *Hermaphrodite flower*, pedicel 2-3 cm long, with paler almost glabrous region of intercalary growth towards base. *Calyx* tube c. 5 mm long, densely rusty-pubescent, with numerous reddish prickles; lobes 5-7 mm long, linear, without prickles. *Corolla* 4-4.5 cm diam., broadly stellate to pentagonal, lobes broadly triangular, tips truncate, acumens scarcely exceeding interacuminal membranes, purple, faintly sweetly scented in cultivation. *Filaments* (Fig. 167) 3-4 mm long; anthers 7 mm long, tapered to narrow apex, erect in cone. *Style* c. 1.8 cm long, erect, pale, bent at tip, exceeding anthers by c. 6 mm; stigma terminal. *Male flowers* in cymes of to 10 flowers, peduncle to first flower c. 3 cm long; floral rhachis to c. 5 cm long gradually extending as flowers open; pedicel 2 cm long. *Calyx* tube 2-3 mm long, with few weak prickles, lobes c. 2 mm long, bluntly triangular, acumens distinct, 1 mm long. *Corolla* 3-3.5 cm diam., broadly stellate, petal tips truncate, acumens scarcely exceeding interacuminal membrane. *Filaments* 2 mm long, anthers c. 6 mm long, tapered, closely erect in firm cone. *Ovary*, style and stigma vestigial, together c. 2 mm long. Fruiting pedicel 3-4 cm long, recurved; calyx finally strongly reflexed, lobes 1 x 0.8 cm, ovate-lanceolate, prickly outside, pale and shining within, crustaceous, acumens c. 5 mm long, only slightly enlarged, withered; *berry* (Fig. 157) 2.5 x 2 cm, broadly ellipsoid, first whitish-green or with faintest purple tinge, finally pale yellow with deeper yellow stripes, succulent but firm. *Seeds* 4 mm long, almost black, distinctly reticulate about slightly thickened margin. *Cotyledons* 14 x 5 mm, long-lanceolate, petiole 4 mm long, first leaf 17 x 12 mm. (Fig. 123.)

Chromosome number: $n = 12$ Randell & Symon (1976).

Notes

Material is inadequate to assess variability in this species.

S. melanospermum is most closely related to *S. chippendalei* from which it differs in its taller, more open habit, more lobed leaves, rusty tomentum and its smaller, ovoid rather than globular fruit. However, the two species do approach one another closely in the NE of N.T. and an almost continuous series between *S. melanospermum*—*S. chippendalei*—*S. phlomoides* could be selected. Despite this, large populations of each species do occur, and typical examples of each species are distinct and are geographically well separated. It does not seem to be biologically or taxonomically useful to consider them as a subspecies or clinal variants until more is known of gene flow between the populations.

S. melanospermum appears to have an active intercalary meristem at the base of the fruiting peduncle which is distinctively pale and which by its active growth causes the peduncle to lengthen in fruit.

Distribution and habitat (Map 9)

N.T., in the vicinity of the McArthur and Robinson Rivers. It has been collected from river flats in open *Eucalyptus* woodland.

Selected specimens (total seen about 6)

NORTHERN TERRITORY: *Perry* 1779, 27.vii.1948, 3 km N of Borroloola Stn (BRI, CANB, MEL, NSW); *Symon* 5064, 5.vi.1967, 32 km NW of Robinson River Headstation (AD, ADW, B, CANB, K, NSW, NT, US).

112. *Solanum clarkiae* Symon, sp. nov.

Frutex 1-2 m altus, effusus, parvus aut magnus, ut videtur annuus vel biennis et post fructificationem mortuus, ut videtur non clonalis. Partes omnes tomento stellato approximato denso pallido vel flavido pubescentes, adpectu generali flavo-virenti, haud valde discolori. *Aculei* usque 8 mm, in caule, et, pedicello et calyce copiosi, in petiolo et utraque pagina folii sparsi vel deficientes. *Folia* juvenilia ambitu ovata, lobis 5-7 brevibus angulatis paucis vel vix evolutis, apice acuto, basi truncata usque subcordata valde obliqua, petiolo 2-3 cm crassiusculo. *Inflorescentia* e flore hermaphrodito inferiore infra racemam cymam (usque 10 cm) usque 20 florum masculorum sistens. *Pedicellus* fructifer c. 3 cm, deflexus, aculeatus; calyx c. 4 cm, linearis, angulatus, basi c. 5 mm latus, valde reflexus, maxime aculeatus; bacca 2-3 cm diam., globosa vel ellipsoidea, viridi-alba usque flava. *Semina* 2.5-3 mm longa, minute rugosa, nigra, in fructibus tribus examinatis 50 vel 150 vel 196.

Typus. D.E. Symon 5156, 11.vi.1967. About large rocky outcrop 16 km southwest of the East Alligator river crossing on the road to Oenpelli, Northern Territory. CANB (holotypus), ADW, B, K, NSW, NT, US. (Fig. 124.)

A spreading small or large *shrub* to 1 x 2 m, apparently annual or biennial, dying after fruiting, not clonal; prickles to 8 mm long, abundant on stems, pedicels, calyx, sparse or absent on petiole, and upper and lower leaf surface; all parts pubescent with close, dense, pale or yellowish tomentum of stellate hairs, general aspect bright yellowish-green. Juvenile *leaves* ovate, with 5-7 shallow, blunt, angular lobes, adult leaves 10 x 6 cm, ovate, entire or with a few scarcely developed angular lobes, apex acute, base truncate to subcordate, very unequal; petiole 2-3 cm long, rather thick. *Inflorescence* an hermaphrodite flower below a racemose cyme of to 20 male flowers, 10 cm long. *Hermaphrodite flower*: pedicel 2.5-4 cm long. *Calyx* tube 5 mm long; lobes 10-13 mm long, long triangular, all prickly. *Corolla* 3-4.5 cm diam., broadly stellate-rotate, interacuminal tissue slightly exceeding petal tip. *Filaments* (Fig. 167) 1-2 mm long; anthers 5-7 mm long, oblong-lanceolate. *Style* 15 mm long, slightly sigmoid; stigma terminal, small, exceeding anthers by 4-5 mm; ovary 2 mm long, glabrous or with few glandular hairs. *Male flower*: pedicel 1.5-2 cm long. *Calyx* tube c. 4 mm long; lobes 1 cm long, lanceolate, sparsely prickly. *Corolla* 3.5 cm long, broadly stellate-rotate. *Filaments* 1 mm long; anthers 6-8 mm long, lanceolate, erect in cone. *Berry* (Fig. 157) 2-3 cm diam., globular or ellipsoid, greenish-white ivory to pale yellow. *Seeds* 2.5-3 mm long, minutely rugose, black. Three fruits from Symon 5156 had 50, 150, 196 seeds and three from Symon 7179 had 193, 203, 212 seeds respectively. *Cotyledons* 15-20 x 9 mm, ovate to oblong-ovate, petiole 4 mm long, first leaf ovate, with few prickles on petiole, second leaf, prickly, entire. (Fig. 126.)

Chromosome number: $n = 12$ Randell & Symon (1976) as "sp. nov. No. 7", Symon 5156. In addition Symon 7179 was also counted as $n = 12$.

Notes

This andromonoecious species is most closely related to *S. melanospermum*. It differs from all other taxa in its apparently biennial habit, producing during their first wet season, stocky, leafy plants which survive the dry winter and then grow into flowering and fruiting plants in the second season after which they die. This life cycle is unusual among Australian species of *Solanum*. From *S. melanospermum* it differs in its larger, nearly entire leaves, lack of rusty tomentum, more globular fruits, and different calyx. The new species is named after Mrs M.A. Clark for her assistance during a *Solanum* collecting trip in northern Australia.

Distribution and habitat (Map 3)

N.T., on the northern and western escarpments of the Arnhem Land plateau. It has been collected from the base of large rocky break-aways. Recent collections have also come from the Wessel Islands where photographs taken by P. Latz show it to be locally abundant.



Fig. 124. Holotype of *Solanum clarkiae* Symon (Symon 5156, ADW).

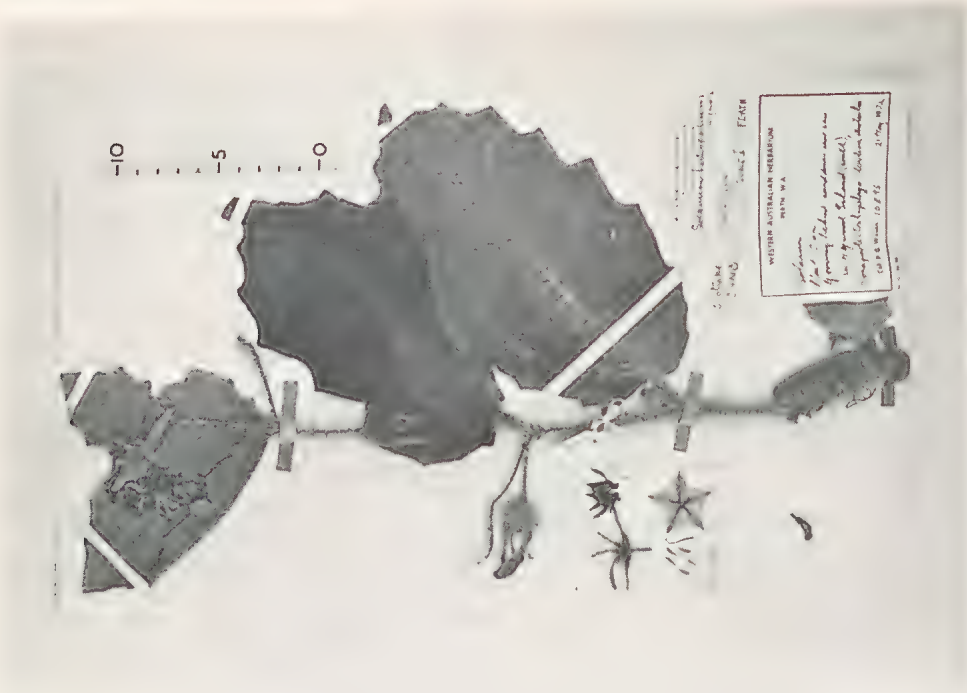


Fig. 125. Holotype of *Solanum heteropodium* Symon (Wilson 10895, PERTH).

Selected specimens (total seen about 9)

NORTHERN TERRITORY: *Symon* 7179, 8.vi.1971, 19 km W of the Alligator River crossing on the road to Oenpelli (ADW, CANB, K, L, NT); *Latz* 3397, 2.x.1972, Wessel Islands (ADW, BRI, CANB, NT).



Fig. 126. *Solanum clarkiae* Symon. Drawn from pot grown plant at the Waite Institute, from *Symon* 7179, collected 19 km west of East Alligator River Crossing, NT (ADW 42129, fruit from ADW 39152). $\times 2/3$.

113. *Solanum diversiflorum* F. Muell., Fragm. 6 (1868) 146.

Type citation: (1) Ad sinum marinum Lagrange Bay, *Martin*; (2) Prope montes Davenport Range, *J.M. Stuart*; (3) Ad originem fluminis Victoriae, *F. Mueller*; (4) Ad portum Walcott, *C. Harper*.



Fig. 127. *Solanum diversiflorum* F. Muell. Drawn from pot grown plant at the Waite Institute; seed collected by F.D. Morgan, from Pt Hedland, WA (ADW 43252). $\times \frac{2}{3}$.

Lectotype: At MEL there are three sheets of syntypes (1) a fragmentary specimen with two labels "Solanum Lat 21.00.00 . . . seed bag 78" and "Solanum diversiflorum F.v.M. Davenport Range" with added notes by R.V. Smith "leg. J. Mc'Douall Stuart"; (2) MEL 12120, three almost leafless twigs "Upper Victoria River Dr. M" and "Solanum diversiflorum Ferd. v. Mueller Upper Victoria River"; (3 & 4) MEL 12119 three leafy pieces with 4 labels—(a) "Solanum diversiflorum! Ferd. v. Mueller, Port Walcott C. Harper"; (b) "Solanum diversiflorum Ferd. v. Mueller, The solitary flower with a prickly calyx the other not N.W. Austr. Martin"; (c) "n. sp. Near Sea Coast Range 2-3' Lagrange Bay Dr. Martin"; (d) A note from R.V. Smith stating that the material had been confused before mounting and it is not now possible to know to which specimens the labels apply. At K is a sheet with three collections and labels of which two are relevant "Solanum pinnatifidum Ferd. Mueller Upper Victoria River (rare) I have but a little fragment left D. M", and "Solanum diversiflorum F. Muell. Port Walcott Harper F. Mueller 1868". The last compares well with the left hand specimen on sheet MEL 12119 which is therefore most probably the Harper collection and I propose that piece as lectotype with an isotype at K.

Literature

Bentham (1868) 461; Mueller (1882) 96; Tepper (1893) 20; Ewart & Davies (1917) 242; Domin (1929) 1140.

A sparingly clonal *shrub* 15-50 cm high, forming rounded intricate bushes often wider than high, probably largely herbaceous, sometimes woody at base; prickles to 1 cm long on stems, leaves (usually), peduncles and calyx; prickles pubescent with stellate hairs for half to three quarters of length, straw coloured; all parts pubescent with stellate hairs (sessile or multiseriate stalked, porrect-stellate with long central ray) general aspect green or grey-green. *Leaves* variable, (2-) 3 (-4) x 1-2 cm, ovate to ovate-oblong, deeply pinnatisect into 5-7 lobes, lower lobes sessile, obovate, 2-5 mm long, sinuses of later lobes not cut right to midrib, oblong or obovate, to 1 x 0.5 cm, in vigorous growth lobes themselves shallowly or deeply lobed, terminal lobe usually oblique, apex blunt or rounded, base of leaves very oblique; petiole 0.3-1.5 cm long, variable. *Inflorescence* with a large basal hermaphrodite flower below a cyme of numerous (c. 20) male flowers; floral rhachis of male flowers 3-5 cm long, male flowers successively shed, frequently 1-2 male flowers open together with buds on apex of a naked rhachis. *Hermaphrodite flower*: pedicel 1-2 cm long, with few small prickles. *Calyx* tube to 5 mm long, very prickly; lobes short; acumens linear, short. *Corolla* c. 3 cm diam., rotate-pentagonal, emarginate, interacuminal tissue exceeding petal tip, purple. *Filaments* (Fig. 167) 1-1.5 mm long; anthers 6 mm long, tapered upwards. *Ovary* glabrous; style 1 cm long, weakly sigmoid; stigma slightly bilobed, green. *Male flower* 2-3 cm diam., rotate, purple. *Calyx* c. 5 mm long, including lobe and acumens, lobe oblong, acumen 1 mm long. *Filaments* short; anthers 4-5 mm long, oblong, tapered. Fruiting pedicel 2-4 cm long, strengthened; calyx lobes 1-1.5 cm long, appressed to base of fruit; *berry* (Fig. 157) 2.5-3 cm diam., depressed-globular, first marbled green, later pale greenish-yellow, firm, fruits often held or developed within plant and often resting on ground, development of one fruit on a branch appears to inhibit development of subsequent fruit. *Seeds* 3.5-4 mm long, dark brown to black, distinctly minutely reticulate. (Fig. 127.)

Chromosome number: $n = 12$ Randell & Symon (1976); in addition plant from *Morgan s.n.* coll. Port Hedland.

Notes

This distinctive species has rarely been confused with others. Some forms of *S. eburneum* have somewhat similar leaves, but different flowers, smaller fruits and are much more restricted in distribution.

Distribution and habitat (Map 5)

W.A. and N.T., from near Onslow northeast to the Fortescue and DeGray Rivers to near Broome, then east along the Fitzroy River and Christmas Creek to Tanami. It occurs on the red sandy plains often with gravelly capping dominated by *Triodia* and sparse *Acacia* woodlands or on low stony hills.

Selected specimens (total seen about 70)

WESTERN AUSTRALIA: *Bynoe s.n.*, 1839-40, Northwest coast (BM, K); *Morrison s.n.*, 1905, between Uaroo and Nanutarra (CANB, E, K, PERTH); *Symon 5281*, 22.vi.1967, Mary River crossing (AAU, ADW, B, CANB, HUI, K, NSW, PERTH, US); *Symon 5350*, 27.vi.1967, 21 km SW of Thangoo Stn turn-off (ADW, B, CANB, K, PERTH, US).

NORTHERN TERRITORY: *Mueller s.n.*, 1855-56, Upper Victoria River (K); *Parker & Latz s.n.*, 1970, Tanami (AD, ADW, NT); *Latz 756*, 1970, McFarlanes Bore (AD, ADW, NT).

114. *Solanum eburneum* Symon, Trans. & Proc. Roy. Soc. S. Aust. 95 (1971) 238.

Type citation: D.E. Symon 6954, 19.v.1971, about 19 km east of the East Baines River, Northern Territory. In seasonally dry shallow *Melaleuca* swamps or flats. Approximate Lat. 15°50'S, Long. 130°00'E.

Holotype: CANB. Isotypes ADW, K, NT, PERTH.

A sprawling, herbaceous or subshrubby, clonal *perennial* to 0.5 m wide, stems short lived or slightly woody at base; prickles to 5 mm long, abundant or scattered on stems, fruiting pedicels and calyx, less common on petioles, upper and lower leaf surfaces; all parts densely pubescent with somewhat loose, pale, stellate hairs, (long to very long multiseriate-stalked, porrect-stellate with long central ray) general aspect grey-green. *Leaves* 2.5-6 x 1.4 cm, rather variable, ovate to elliptic, with 5-7 deep or shallow lobes, lower lobes cut to three-quarters of way to midvein, others shallower; sinuses mostly rounded, apices rounded or acute; leaf base oblique, truncate to cuneate, occasional almost lanceolate leaves with few lobes occur. *Inflorescence* an hermaphrodite flower below a cyme of male flowers. *Hermaphrodite flower* situated to 1 cm from base of peduncle; pedicel c. 1 cm long, prickly. *Calyx* tube 2-3 mm long, prickly; lobes 5 mm long, triangular, tips distinct, often 2-3 lobes partially fused to give calyx a two lipped appearance. *Corolla* 3 cm diam., pentagonal. *Filaments* (Fig. 167) 1-2 mm long; anthers 7 mm long. *Ovary* globular, with few glandular hairs at summit; style c. 1 cm long; stigma capitate. *Male flower*: peduncle 1-6 cm long; with 3 to many flowers. *Calyx* c. 5 mm long, sometimes two lipped. *Corolla* 2-3 cm diam., pentagonal. *Filaments* short; anthers c. 6 mm long, oblong, slightly tapered. *Ovary* lacking. Fruiting pedicel 2-3 cm long, deflexed, with scattered prickles; calyx lobes 1-1.5 cm long, triangular, prickly, finally raised or recurved; *berry* (Fig. 157) 1.5-2.5 cm diam., globular, first striped green, later pale whitish-greenish-yellow. *Seeds* 2-2.5 mm long, very dark brown or black, minutely reticulate. Ten fruits had (29-) 57 (-99) seeds per fruit. *Cotyledon* 15 x 4 mm, lanceolate, first leaf 12 x 9 mm, ovate, second leaf 15 x 7 mm broad, lanceolate, undulate margin, margin of third leaf more undulate. (Fig. 128.)

Chromosome number: n = 12 Randell & Symon (1976).

Notes

Some variation in leaf lobing occurs and plants with deeply or shallowly lobed leaves are found. *S. eburneum* is most closely related to *S. diversiflorum* and differs from that species in its simpler and less intricate growth habit, larger leaves and smaller fruits. It appears less closely related to *S. chippendalei* from which it differs in its herbaceous or sub-shrubby habit, smaller stature, and fruits.

Distribution and habitat (Map 2)

North-west N.T. in the vicinity of the East Baines River, *S. eburneum* is restricted in its distribution and has been collected chiefly along the main road. It occurs on broad, shallow, seasonally dry *Melaleuca* swamps or flats with heavy grey soils.

Selected specimens (total seen about 14)

NORTHERN TERRITORY: *Symon* 5229, 18.vi.1967, 24 km E of the East Baines River (ADW, B, CANB, K, NSW, NT, PERTH, US); *Symon* 6956, 19.v.1971, 24 km W of the East Baines River (ADW, CANB, K, L, NT).



Fig. 128. *Solanum eburneum* Symon. Drawn from herbarium specimen, *Symon* 6954, collected 19 km east of the East Baines River, NT (ADW 43270). $\times 2/3$.

115. *Solanum heteropodium* Symon, sp. nov.

Frutex effusus vel subscandens usque 1.5 m. *Aculei* usque 1 cm, inaequales, pallidi, recti, copiosi vel densi utrinque praeter foliae laminas sed in costis, plerumque absentes extremis calycis lobis. Omnes partes densis stellatis pilis pubescentes; adspectu generali flavo-virenti. *Folia* juvenilia 22 x 12 cm late elliptica usque 12 brevibus late triangularibus lobis; basis rotundata aut cordata, nervis infra prominentibus; petiolus 1-4 cm. Superiora folia sessilia aut petiolis brevissimis (0-5 mm), ovata ambitu 7-10 x 4-6 cm, circa 6 lobis obtuse triangularibus; basis rotundata aut subcordata, obliqua; folia superiora saepe geminata, unum magnum, alterum minus. *Inflorescentia*: flos solitus hermaphroditus infra florum masculinorum cymam. *Flos hermaphroditus*: petiolus 1-1.5 cm; minime sursum tumidus aculeatus; tubus calycis circa 5 mm, aculeatus;



Fig. 129. *Solanum heteropodium* Symon. Drawn from holotype specimen, Wilson 10895, collected from Heywood Island, Bonaparte Archipelago, WA (PERTH). $\times 2/3$.

lobi calycis triangulares, basi aculeati, apicibus linearibus viridibus foliosis 1-1.5 cm longis paucos aculeos ferentibus. *Corolla* 3.5 cm diametro late stellata ad pentagonalis; filamenta 2 mm; antherae 7-8 mm, lanceolatae; ovarium glabrum; stylus 1.5 cm, sigmoideus. *Flores masculini*: cyma racemosa, pauci ad 12 flores; denum 4-8 cm longa, dense aculeata; pedicellus 1-1.5 cm; tubus calycis 3-4 mm; lobis calycis 5-8 mm inaequales, linear-lanceolati. *Corolla* 3.5 cm diametro, late stellata; filamenta 1-1.5 mm; antherae 7-8 mm longae, pro ratione magnae, lanceolatae; ovarium et stylus et stigma vestigiale, in toto 2 mm longum. Fructifer pedicellus ad 3.5 cm sursum parum tumidus; calyx aculeata, accrescens et tegens partem majorem baccae. *Bacca* 1-1.5 cm diametro, minime bilobata; color et natura ignota. *Semina* 4 mm longa plus minusve crassa, rotata, nigra, reticulata; 50 in una bacca.

Typus: P.G. Wilson 10895, 21.v.1972. Heywood Island (south), Bonaparte Archipelago, Western Australia. "Plant 60 cm, growing behind sand dunes near the sea". PERTH (holotypus); ADW, CANB. (Fig. 125.)

A sprawling or subscandent *shrub* to 1.5 m tall; prickles to 1 cm long, unequal, pale, straight, or slightly pointing upwards, abundant to dense on all parts except leaf blades, present along main veins on both upper and lower surfaces, largely absent from distal parts of calyx lobes; all parts densely pubescent with close, minute, stellate hairs, (sessile or shortly multiseriate-stalked, porrect-stellate with medium to long central ray). *Leaves* variable in size and disposition, lower leaves to 22 x 12 cm, broadly elliptic, with to 12 shallow, broadly triangular lobes, sinuses shallow and rounded, lobe apex obtuse, leaf apex acute, leaf base rounded or cordate, veins prominent below, petiole 1-4 cm long. Upper leaves sessile or shortly petiolate, petiole to 5 mm long, ovate, 7-10 x 4-6 cm, with c. 6 shallow, broadly triangular lobes, sinuses shallow and rounded, leaf base rounded or subcordate, oblique, upper leaves often paired, larger one with a smaller leaf c. three quarters its size, adjacent or almost opposite, general aspect yellowish-green. *Inflorescence* a single hermaphrodite flower below a cyme of male flowers, leaf opposed or nearly so, both hermaphrodite flower and raceme of male flowers appear to have an abscission layer at base. *Hermaphrodite flower*: petiole 1-1.5 cm long, slightly thickened upwards, prickly, inserted at base of raceme of male flowers. *Calyx* tube c. 5 mm long, densely prickly; lobes triangular, prickly at base, tapering into linear, green, leafy apices 1-1.5 cm long that bear few prickles. *Corolla* 3.5 cm diam., broadly stellate to pentagonal, lobe apices distinct. *Filaments* (Fig. 168) 2 mm long; anthers 7-8 mm long, lanceolate. *Ovary* glabrous; style 1.5 cm long, sigmoid, apex curved, stigmatic area small. *Male flowers*: a cyme of to 12 flowers, first short and congested, gradually lengthening as flowering proceeds, finally 4-8 cm long, densely prickly, pedicel 1-1.5 cm long. *Calyx* tube 3-4 mm long; lobes 5-8 mm long, unequal, linear-lanceolate. *Corolla* 3.5 cm diam., broadly stellate. *Filaments* 1-1.5 mm long; anthers 7-8 mm long, relatively large, lanceolate. *Ovary*, style and stigma vestigial, together c. 2 mm long. Fruiting pedicel to 3.5 cm long, slightly swollen upwards; calyx densely prickly, enlarged to cover most of berry; *berry* (Fig. 157) 1-1.5 cm diam., slightly bilobed, broadly attached at base to calyx tube, possibly circumscissile at junction, colour and texture not known, mature berry apparently dry or nearly so; calyx lobes may become almost leafy, somewhat spatulate, to 5 mm wide and 3 cm long, sparsely prickly. *Seeds* 4 mm long, somewhat thick and rounded, black, reticulate, 50 in the one fruit available. (Fig. 129.)

Chromosome number: unknown.

Notes

More and better collections of this rare species are still needed. It does not appear to be closely related to other Australian andromonoecious species. The relatively small, slightly bilobed fruit, broadly attached at the base is reminiscent of *S. oedipus* from which it differs in many characters.

The specific epithet was suggested by the varied length of the petiole which is well developed in lower leaves and becomes increasingly shortened with growth and development so that the upper leaves are sessile.

Distribution and habitat (Map 6)

W.A., far north-western coast and adjacent off-shore islands. Little is known of its ecology but it has been collected from dense woodlands.

Specimens examined

WESTERN AUSTRALIA: Kimberley coast. *Bradshaw & Allan s.n.*, 1891, Prince Regent River (MEL); *Fitzgerald 1459*, Aug. 1905, Edkin Range (PERTH); *Gardner 1360*, 10.vi.1921, Prince Regent River (PERTH); *Wilson 10755*, 14.v.1972, Augustus Island, Bonaparte Archipelago. "Subscandent plant growing at base of cliff in dense woodland" (ADW, PERTH); *Wilson 11381*, 5.vii.1973, Boongaree Island, Prince Frederick Harbour. Approx. 15°5'S, 125°10'E. "Open plant 1 m high, in dense *Eucalyptus miniata* forest" (ADW, CANB, K, NT, PERTH); *Wilson 11486*, 11.vii.1973, Byam Martin Island, Bonaparte Archipelago. Approx. 15°24'S., 124°22'E. "Plant to 1.5 m high growing in *Acacia* scrub with *Plectrachne*" (ADW, PERTH); *Marshall s.n.*, 4.vi.1975, Mitchell River Falls, Mitchell Plateau (ADW).

116. *Solanum oedipus* Symon, Trans. & Proc. Roy. Soc. S. Aust. 95 (1971) 232-233.

Type citation: D.E. Symon 7119, 29.v.1971, from low quartzite outcrop between Kalumburu Mission and Longini Landing, Kimberley Division, Western Australia. "An erect shrub to 2 m, bright green in aspect, forming a colony of a few stems". Approximate Lat. 14°15'S, Long. 126°36'E.

Holotype: CANB. *Isotypes*: ADW, K, L, NT, PERTH.

Solanum pectinatum A. Cunn., nomen nudum; Benth., Fl. Austral. 4 (1868) 459.

An erect, sparsely branched andromonoecious *shrub* to 2 m high, forming small colonies of few stems, young stems green and prickly, older ones brown, woody, almost without prickles; prickles 5-10 mm long, straight, slender and pale, abundant on stems, calyx tube and lobes, scattered on upper and lower leaf surface, petiole and peduncle, absent from fruiting pedicel; leaves with tomentum of minute stellate hairs (sessile porrect-stellate with short or medium central ray) in leaf axils, petioles, leaf bases of young leaves and on inflorescence; general aspect bright green, concolorous. *Leaves* (7-) 9 (-20) x (3-) 5 (-8) cm, elliptic, with to 19 triangular lobes along margin; lobes with 1-2 smaller lobes, sinuses rounded, shallow, rarely cut more than one quarter of way to midrib, leaf and lobe apex acute or acuminate; leaf base cuneate, oblique; petiole 1-3 (-10) cm long. *Inflorescence* a single hermaphrodite flower at base of cyme of male flowers; rhachis of male flowers 4-20 cm long, bearing to 60 flowers. *Hermaphrodite flower*: peduncle to first flower 2 cm long, stout and prickly; pedicel 1.8 cm long, glabrous, purple. *Calyx* tube 5 mm long, deeply ribbed, densely prickly with minute glandular hairs and conspicuous pale prickles to 1 cm long; lobes 1.5-2.5 cm long, narrow-triangular, tapering to linear tips, unequal, prickly. *Corolla* 4.5-5.5 cm diam., stellate, colour RHS Heliotrope 636, with sparse and minute, simple and stellate hairs on outside. *Filaments* (Fig. 168) 2 mm long; anthers 10-12 mm long, lanceolate, erect. *Style* 18 mm long, erect, pale, slightly sigmoid, tip bent; stigma terminal, simple, green; ovary globular glabrous. *Male flowers*: pedicel 1.5 cm long, glabrous, purple. *Calyx* tube short, lobes 5-15 mm long, unequal, narrow-triangular, with linear tips, less prickly than hermaphrodite flowers. *Corolla* 3.5-4.0 cm diam., broadly stellate. *Filaments* 1-2 mm long; anthers 8-11 mm long, lanceolate, erect. *Style* and stigma 1-2 mm long, vestigial, some lower 'male' flowers on plants in cultivation had well developed styles, in others the inflorescence forked above hermaphrodite flower to produce twin cymes of male flowers. Fruiting pedicel 2 cm long, tapered and enlarged to 5-6 mm diam. at base of calyx tube; calyx tube 5-6 mm long, lobes 1.5-2 cm long, triangular, tips linear, exceeding and enclosing fruit visible between lobes; *berry* (Fig. 158) 1.5-2 cm diam., globular, very slightly bilobed in few seen, pale green. *Seeds* 4-4.5 mm long, relatively thick, black, distinctly muricate, 37 and 38 seeds in two fruits examined. (Fig. 130.)

Chromosome number: n = 12 Randell & Symon (1976).

Notes

The small amount of material available suggests that this may be a variable species, but assessment is made difficult by the generally scrappy and inadequate collections and the known changes in morphology of the single collection in cultivation. Its relationships with other Australian species are obscure. None of the other andromonoecious species appear to be closely related to it with the possible exception of *S. heteropodium* which has a somewhat similar fruit but differs in many other characters. In addition *S. heteropodium* itself is poorly known. *S. oedipus* shares with *S. leopoldensis* its green



Fig. 130. *Solanum oedipus* Symon. Drawn from herbarium specimen and photo of plant grown at the Waite Institute, from seed collected, Symon 7119, near Kalumburu, WA (ADW 43271 and 44577). $\times 2/3$.

aspect, minute pubescence, prickly nature, and similar leaf shape, but not size. It differs from *S. leopoldensis*, which is dioecious, in its different calyx, fruit, seeds and growth habit. Both are found in rocky sites. When well grown, *S. oedipus* makes a handsome if formidable plant with its array of prickles, bright green leaves and showy purple flowers.

This species was confused with *S. cataphractum* in the original collection by Cunningham. From these a lectotype for *S. cataphractum* has been selected (q.v.).

Distribution and habitat (Map 6)

Western Australia, north coast of the Kimberley Division in the vicinity of the Kalumburu Mission, there amongst rocky quartzite outcrops.

Specimens examined

WESTERN AUSTRALIA: Symon 10188, 26.v.1975, Kalumburu (ADW, B, K, L, MO, PERTH); in addition material grown from this collection has been sent to AAU, B, CANB, K, L, MO, NT, PERTH; Cunningham 1-191, 1820, Montague Sound (as *S. cataphractum*) (BM, BRI).

117. *Solanum dioicum* W.V. Fitzg., Jour. Roy. Soc. W. Aust. (1916-17, issued 1918) 203.

Type citation: "Dillons Springs (W.V.F.)" The label gives the information "*Solanum dioicum* W.V.F. sp. nov. Dillon's Springs, E Kimberley, October 1906".

Holotype: NSW. *Isotypes*: ADW, BM, E.

Note

The name *S. dioicum* might be considered a nomen nudum. It was listed as a new species on p. 104 and in the index and is used on the type specimen sheets, but in the original description Fitzgerald repeated the name of the preceding *Solanum* which was *S. cunninghamii* Benth. In the interests of nomenclatural stability the use of *S. cunninghamii* is best considered a typographic error as the authors intention to use *S. dioicum* is unambiguous.

Literature

Gardner (1923) 89 as *S. dioecium*.

Erect or spreading clonal *shrubs* 0.5-1 m tall, herbaceous or subwoody below, growing from adventitious buds on shallow, spreading root systems, dioecious i.e. separate male and hermaphrodite plants; prickles 5-10 mm long, unequal, pale, straight or slightly retrorse, often pubescent towards base, scattered to abundant on stems, usually few on petioles, occasional or absent on veins of upper and lower leaf surface, abundant and conspicuous on calyx of hermaphrodite flower and fruiting calyx, fewer on calyx of male flowers; all parts closely and densely pubescent with stellate hairs (long or short multiseriate-stalked, porrect-stellate with short, medium or long central cell) somewhat rusty or rarely silvery, scarcely discolourous, general aspect drab green. *Leaves* (3.5-) 7 (-13) x (1.5-) 2 (-5) cm, ovate, ovate-lanceolate to elliptic, entire, apex acute to acuminate, base rounded to broadly cuneate, oblique; veins prominent below; petiole 1-2 cm long. *Inflorescence* a solitary hermaphrodite flower on the fruitful plants and racemose cymes of male flowers on male plants. *Female flower*; peduncle 1-2 mm long, or absent, pedicel 5-8 mm long, stout. *Calyx* 5-7 mm long, campanulate, main vein prominent, often obscured by dense prickles; lobes to 2 cm long, unequal, linear, unarmed. *Corolla* 3-5 cm diam., broadly stellate, interacuminal tissue exceeding acumens by 1-2 mm, thus having emarginate or 10-lobed appearance. *Filaments* (Fig. 168) 1.5-2 mm long; anthers c. 5 mm long, closely erect. *Ovary* 2 mm diam., with few glandular hairs; style 7-9 mm long; stigma conspicuously bifid, individual arms 2-5 mm long. *Male flowers*: cyme of up to 20 flowers, gradually lengthening, presenting a few open flowers at a time successively shed, floral rhachis 2-10 cm long, scattered prickles

on lower portion, pedicel 5-7 mm long, slender. *Calyx* tube 3-4 mm long, unarmed or with occasional prickle, lobes short, truncate or broadly triangular, extended into linear acumens 1-2 mm long. *Corolla* 2-3 cm diam., rotate, shallowly campanulate, inter-acuminal tissue exceeding short acumens, having an emarginate or shortly 10-lobed effect. *Filaments* c. 1 mm long; anthers c. 5 mm long. *Ovary*, style and stigma vestigial or greatly reduced, reaching 5-8 mm long. Fruiting peduncle 2-3 cm long, stout,



Fig. 131. *Solanum dioicum* W.V. Fitzg. Male plant drawn from herbarium specimen, Symon 7165, from 51 km west of Louisa Downs Stn, 72 km east of Mary River, WA (ADW 39735). $\times \frac{2}{3}$.

deflexed; calyx tube 2.5 cm diam., enlarged to cover berry entirely, very prickly; calyx lobes 0.5-1.5 cm long, linear, unarmed, orifice varies in size, tube sometimes ruptured; *berry* (Fig. 158) 2-2.5 cm diam., globular, first shining green, later yellowish-green, drying pale-brownish, calyx may expose berry to varying degrees, not reflexed to any great extent. *Seeds* 2-2.5 (-3) mm long, minutely reticulate, black or very dark brown, 400-900 seeds per fruit. *Cotyledons* 7 x 4 mm, lanceolate, first leaf 15 x 8 mm, oval, second leaf similar, third leaf with few prickles at base, entire. (Figs 131 and 132.)



Fig. 132. *Solanum dioicum* W.V. Fitzg. Female plant drawn from herbarium specimen, Symon 6979, 21 km west of Louisa Downs Stn, WA (ADW 39730). Flower from Symon 7166, 51 km west of Louisa Downs Stn, WA. $\times 2/3$.

Chromosome number: $n = 12$ & $n = 24$ Randell & Symon (1976); in addition Symon 5286, 5339, 6938, 6993, 6994, 7008, 7061, 7165 have been counted as $n = 12$, and Barlow 1202, Symon 5244, 5245, 5255, 5338 as $n = 24$.

Notes

The *Solanum cunninghamii*, *dioicum*, *petraeum* group is both extremely interesting and complex. A great array of variants is to be found, particularly in foliage and to a lesser extent in fruit characters. To date it has not been possible to order these in consistent subunits and the three names here cover the principal groups of which widespread populations exist. Within each of these groups more localised variants occur. *S. dioicum* itself can be divided, firstly, into plants from the Kimberleys (often north or northeast of the King Leopold Ranges) that have relatively narrow leaves, are often asperous, often rusty-tomentose, and which include the type of the species. A second group exists south of the Kimberley Ranges plants of which are generally broader leaved, not so rusty pubescent, and extend as far south as near Port Hedland. The third group occurs mainly inland and on the eastern margin of the distribution range; they are plants closely and densely silvery-pubescent, compact, and extremely prickly. Field counts have given ratios of female to male plants of about 1:1 but the facility for clonal reproduction complicates counting. Diploids and tetraploids both occur and these have not and cannot be separated on the basis of gross morphology.

The relationships of the dioecious species to other Australian solanums are speculative. They are probably a derived group from the andromonoecious species and *S. phlomoides* or *S. beagleholei* could possibly be ancestral. With the exception of *S. dioicum* most of the species are very localised and mainly north western in distribution.

Distribution and habitat (Map 11)

W.A., N.T., Kimberley Division from near Port Hedland in the south-west to Wyndham in the north-east and entering N.T. east of Kununurra to Tanami. It has been collected from many sites, sand plains, alluvial flats, at the base of rock masses and in rocky outcrops, in hummock (*Triodia*) grasslands or sparse open woodlands.

Selected specimens (total seen about 80)

WESTERN AUSTRALIA: *Group one*—Northern Kimberleys: Symon 7064, 27.v.1971, 11 km S of Gibb River Stn (ADW, CANB, K, L, PERTH); Symon 10268, 1.vi.1975, 15 km E of Hann River crossing on road to Tableland Stn (ADW, NSW, PERTH, US); Symon 10274, 1.vi.1975, 40 km E of Train River on road from Mt House to Tableland Stn (ADW, CANB, L, MO, PERTH); Symon 10323, 4.vi.1975, 33 km S of Wyndham (ADW, MO, PERTH).

Group two—mainly south of the Kimberleys: Symon 7159, 4.vi.1971, McSpeery Gap (AAU, ADW, NSW, PERTH); Symon 7165, 5.vi.1971, 51 km W of Louisa Downs Stn (ADW, B, CANB, L, PERTH); Symon 5335, 26.vi.1967, 35 km W of Fitzroy Crossing (ADW, B, CANB, K, NSW).

Group three—Inland & Tanami: Latz 4019, 20.vii.1973, Denison Range (ADW, DNA, NT); Symon 5242, 18.vi.1967, 14 km W of East Baines River (ADW, B, BIRM, CANB, K, NSW); Symon 6937, 18.v.1971, 60 km SW of Hookers Creek (ADW, CANB, K, NT, PERTH); Beaglehole 47152, 10.vii.1974, S side Cockburn Range (acb, ADW).

118. *Solanum cunninghamii* Benth., Fl. Austral. 4 (1868) 465.

Type citation: "N. Australia. Cygnet Bay, N.W. coast, A. Cunningham, Bynoe; Glenelg district, Marten".

Syntypes: At MEL is a fragment with the label "*Solanum Cunninghamii* Benth. N. 97 Alluvial soil 4-5 ft high Glenelg District Dr. Martin". At BM are two sheets with the labels (1) "A. Cunningham Cygnet Bay 1822 *Solanum salvifolium*", and (2) "Australian A. Cunningham 1821-2 Cygnet Feb 22" and "134". At K are two sheets with the labels (1) "*Solanum salvifolium* C non Lam^k Cygnet Bay N.W.C. attached to the

plant, and (2) a sheet with 8 pieces, 4 of which have the number 2 written against them, and 5 labels; (a) "*Solanum Cunninghamii* N.W. Coast Australia Bynoe Herb. Hook." to which the number 2 pieces seem to belong, (b) "*Solanum salvifolium* (non Lam^k) sp. nov. Cygnet Bay N.W.C." attached to twig, (c) '134' attached to twig and (d) "*Solanum salvifolium* A. Cunn. *S. Cunninghamii* Benth. Cygnet Bay 134/1822 Feby. N.W. Australia A. Cunningham". *Lectotype*: I propose the portion labelled "134" at K as lectotype.



Fig. 133. *Solanum cunninghamii* Benth. Male plant drawn from pot grown plant at the Waite Institute, from Symon 5345, collected near the old jetty, Broome, WA (ADW 42424). $\times 2/3$.

Literature

Bentham (1868) 465; Mueller (1882) 96; Fitzgerald (1918) 102; Ewart & Davies (1917) 242.

A slender, erect, clonal, dioecious, *shrub* 1- (2) m tall, probably largely herbaceous, scarcely woody at base; prickles 2-5 mm long, straight, slender, scattered on stem or absent, not conspicuous except on fruiting calyces; all parts pubescent with close, dense, stellate hairs, general aspect rusty-green; leaves discolorous, green above, silvery or



Fig. 134. *Solanum cunninghamii* Benth. Female plant drawn from herbarium specimen, Symon 6999, from 3 km from Broome, on the road to Cable Bay, WA (ADW 40604). Flower from Symon 5341, from near the jetty, Broome township, WA (ADW 37186). $\times \frac{2}{3}$.

rusty below. *Leaves* 3-7 x 1 cm. lanceolate-elliptic, entire, apex acute or acuminate, base cuneate, oblique; petiole 0.5-1 cm long. *Inflorescence* of male flowers an erect cyme 10-15 cm long, with c. 50 flowers, successively shed as matured, producing a bare rhachis with tuft of 2-3 open flowers and buds at summit; peduncle 2-3 cm long; flowering rhachis 10-15 cm long; pedicels 2-4 mm long. *Calyx* tube 1-2 mm long, open; lobes 2-3 mm long, triangular; acumens 1 mm long. *Corolla* 2.5-3 cm diam., rotate, shallowly campanulate, purple-blue. *Filaments* (Fig. 168) 1 mm long; anthers 3 mm long, oblong, loosely erect. *Ovary* vestigial. *Female flowers* solitary, extra-axillary or leaf opposed; pedicel c. 1 cm long, with few prickles. *Calyx* tube c. 7 mm long, very prickly; acumens 1 cm long, linear, distinct, sometimes unequal, almost without prickles. *Corolla* 2-3 cm diam., rotate, purple. *Filaments* 1-2 mm long; anthers 3-4 mm long; oblong. *Ovary* 2-3 mm diam., globular, glabrous; style 5-6 mm long, glabrous; stigma bifid, conspicuous, each arm to 5 mm long. Fruiting pedicel 1.5-2.5 cm long, firm and deflexed; calyx membranous, enclosing fruit, prickles to 5 mm long, conspicuous, acumens c. 1 cm long; *berry* (Fig. 158) 2 cm diam., globular or depressed globular, mature texture and colour not known. *Seeds* 2 mm long, numerous, distinctly reticulate under lens, dark slaty-brown. (Figs 133 and 134.)

Chromosome number: $n = 12$ Randell & Symon (1976), as *S. dioicum* Fitz. sens. lat., Symon 5345 and Symon 7000 both in the vicinity of Broome.

Notes

S. cunninghamii and *S. cataphractum* were considered by Bentham to be monoecious which is not surprising considering the inadequacy of many of the early collections and the lack of field notes or population studies. The biology and taxonomy of the complex involving *S. cunninghamii* and *S. dioicum* has not yet been clarified. A great array of variation is present and users of this revision will find intermediates and extreme variants very discordant with the types. To publish numerous new names is not helpful until more of the biology and regional variation is better understood. *S. cunninghamii* represents the relatively slender, narrow leaved, rusty-tomentose plants from along the coast in the general vicinity of Broome. The inland plants (*S. dioicum*) reaching the N.T. tend to have broader leaves, paler tomentum and more prickles. Extremes there may appear silvery and have densely prickly fruiting calyces. In the northern Kimberleys the populations with smaller, narrower leaves and smaller fruits have been named here as *S. petraeum*.

Distribution and habitat (Map 10)

W.A., *S. cunninghamii* s.s. is confined to the subcoastal areas in the general vicinity of Broome often on deep red sandy soils, in open woodlands.

Selected specimens (total seen about 25)

WESTERN AUSTRALIA: Symon 5339, 26.vi.1967, 96 km NE of Broome on road to Derby (ADW, B, CANB, K, NSW); Symon 6999 & 7000, 25.v.1971, Cable Bay 3 km from Broome (ADW, CANB, L, PERTH).

119. *Solanum petraeum* Symon, sp. nov.

Frutex effusus dioecius 1-1.5 m altus. *Aculei*, usque 5 mm longi, inaequales, pallidi vel straminei, plurimi in caule, densi in tubo calycis. Partes omnes pilis stellatis densis pubescentes, ad aspectu generali griseoviridi parum discolori. *Folia* juvenilia 18 x 5 cm ambitu lanceolata utrinque; 3-4 lobis brevibus triangularibus; folia adulta 3-7 x 1-1.2 cm lanceolata, integra, subtus pallida, in costa paucis aculeis petiolo circa 1 cm. *Inflorescentia* masculae plantae-cyma 7-8 cm, 10-14 flores; pedicellus 8-10 mm; tubus calycis 2-3 mm, aculeatus, lobis 4-5 mm angustis triangularibus. *Corolla* 1.5-2 cm diametro, late stellata, lilacina, filamenta 1-1.5 mm; antherae 4-5 mm, lanceolatae, erectae; ovarium et stylus vestigialis. Flos bisexualis solitarius sine pedunculo; pedicellus 12 mm; tubus calycis 5 mm, spinosus, lobis 5-6 mm linearibus sine aculeis. *Corolla* 2-3 cm diametro late pentagonalis usque rotata, lilacina; filamenta 1.5-2 mm; antherae 4 mm cuneatim oblongae; ovarium globulare et glabrum; stylus 5 mm, erectus, pallidus; stigma viride. *Bacca* 1.5 cm diametro, depressa, globularis, in aculeato calycis tubo inclusa; fructus maturus firmus non succulentus, pallidus. Semina 1.5 mm parva hepatica.

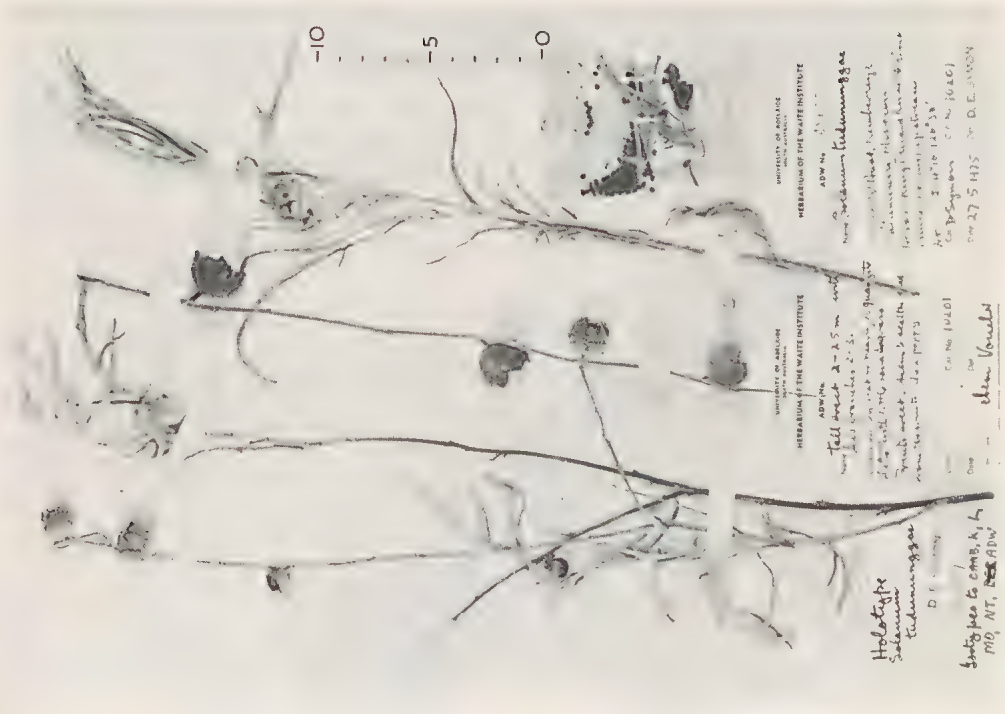


Fig. 136. Holotype of *Solanum nudunggae* Symon (Symon 10201, PERTH).



Fig. 135. Holotype of *Solanum petraeum* Symon (Symon 7139, PERTH).

Typus: D.E. Symon 7139, collected at "Surveyor's Pool, Mitchell Plateau far NW of W. Aust. at approximately 14°40'S, 125°46'E, 1.vi.1971. Shrubs among blocky sandstone walls of the falls and pool". PERTH (holotypus); ADW, CANB, K, L, NT. The type was from a mature fruiting plant; specimens from a male plant, Symon 7140 (without flowers), were collected at the same site. The material used for the description of the flowers and juvenile states was grown from Symon 7139. (Fig. 135.)



Fig. 137. *Solanum petraeum* Symon. Male plant drawn from pot grown plant at the Waite Institute, from Symon 7139, collected from Survey Pool, near Pt Warrender, WA (ADW 44575). $\times \frac{2}{3}$.

A spreading dioecious *shrub* 1-1.5 m high, foliage somewhat sparse with age; prickles to 5 mm long, variable in size, pale or yellowish, abundant on stems and dense particularly on main veins of calyx tube; all parts with close, dense tomentum of stellate hairs (stalked or sessile porrect-stellate, with long central ray), general aspect grey-green. *Leaves* variable in size, younger leaves to 18 x 5 cm, lanceolate with c. 3-4 shallow-triangular lobes on each side, sinuses rounded, cut $\frac{1}{4}$ - $\frac{1}{3}$ of way to midrib, lobes



Fig. 138. *Solanum petraeum* Symon. Female plant drawn from pot grown plant at the Waite Institute from Symon 7139, collected from Survey Pool, near Pt Warrender, WA (ADW 44575). $\times \frac{2}{3}$.

broadly triangular or rounded, leaf base oblique, petiole to 3 cm long, mature leaves smaller, 3-7 x 1-1.2 cm, lanceolate, entire, paler below with few prickles on midvein above or below, petiole 1 cm long or less. *Inflorescence* of male plant a slender cyme to 7-8 cm with 10-14 flowers; peduncle c. 4 cm long; floral rhachis elongating as male flowers successively mature; pedicel 8-10 mm long. *Calyx* 2-3 mm long, prickly; lobes 4-5 mm long, narrow triangular to linear. *Corolla* 1.5-2 cm diam., broadly stellate; lobes triangular, pale lavender. *Filaments* (Fig. 168) 1-1.5 mm long; anthers 4-5 mm long, lanceolate, loosely erect. *Ovary* and style vestigial; flowers faintly sweetly scented. *Female flower* solitary; peduncle absent; pedicel 12 mm long. *Calyx* 5 mm long, prickly; lobes 5-6 mm long, linear, unarmed. *Corolla* 2-3 cm diam., broadly pentagonal to rotate, lavender. *Filaments* 1.5-2 mm long; anthers 4 mm long, tapered oblong. *Ovary* globular, glabrous; style 5 mm long, erect, pale; stigma green. *Berry* (Fig. 158) 1.5 cm diam., depressed-globular, enclosed in intensely prickly calyx tube, prickles concentrated on main veins, tips of lobes linear and unarmed, berry finally firm and hard, not succulent, pale. *Seeds* 1.5 mm long, small, oval to unequal reniform, dark brown to liver-coloured, 410, 441, 538 in three fruits counted. *Cotyledons* 5 x 4 mm, ovate-acute, petiole 3 mm long, first leaf 12 x 8 mm, oval. (Figs 137 and 138.)

Chromosome number: $n = 12$ Randell & Symon (1976), as "sp. nov. No. 5", Symon 7139 (type collection).

Notes

This is part of the complex of dioecious species largely confined to the Kimberley area of Western Australia. It is related to *S. cunninghamii* and *S. dioicum*, but differs from both in its more slender growth, smaller, narrower leaves, pale flowers, smaller fruits and seeds. In all of these species, differences in growth stage and environmental conditions result in a considerable degree of variability of the leaves.

Distribution and habitat (Map 10)

W.A., in the far north-west of the Kimberley Division. It has been collected from sites among or at the base of massive quartzite rocks in monsoonal scrubs and woodlands.

Selected specimens (total seen about 6)

WESTERN AUSTRALIA: Symon 10221♂ and 10222♀, 29.v.1975 Surveyors Pool, Pt Warrender, (ADW, CANB, K, PERTH); Symon 7118, 29.v.1971, between Kalumburu Mission and Longini Landing (ADW, CANB, NSW, NT, PERTH).

120. *Solanum cataphractum* A. Cunn. ex Benth., Fl. Austral. 4 (1868) 459.

Type citation: "N. Australia. Bat Island and Regent River, N.W. Coast, A. Cunningham (with linear-lanceolate leaf-lobes); Montague Sound, A. Cunningham (with broad less deeply lobed leaves). The specimens are all in fruit only. I describe the flowers from Cunningham's notes and from a drawing of a plant formerly raised in Kew Gardens from his seeds. He distinguished the broad leaved form as a species under the name *S. pectinatum*".

Syntypes: The collections cited by Bentham are mixed and consist of two species. At BRI is a sheet labelled "*A. Cunningham* 191 Montague Sound 1820". I consider this to be *S. oedipus* Symon. At MEL is a sheet with several labels but basically "*A. Cunningham* 132 Regents River" (one label say 1821, the other 1822). This I consider to be *S. cataphractum*. At BM are three sheets, (i) of two pieces with three labels "Regents River 1821" and "No. 132" and "Regents River 1821-2 Australia *A. Cunningham* Voyage of "Bathurst" 1821-2." Both pieces are uniform and I consider them to be *S. cataphractum*; (2) a sheet of two pieces labelled "192" and "Bat Island Australia *A. Cunningham* 3rd Voyage of Mermaid 1820". This material is mixed, the lefthand

piece being *S. oedipus* and the righthand *S. cataphractum*; (3) a sheet of two pieces labelled "A. Cunningham Montague Sound 1820", "191", and "Australia A. Cunningham 3rd voyage of Mermaid 1820". I consider both these pieces to be *S. oedipus*. At K is a sheet of 4 pieces all uniform (a) lower right label attached, "*Solanum cataphractum* A. Cunn. Pt. Nelson and Bat Island", (b) upper right label attached, "132/?voy" and adjacent to this specimen "*Solanum cataphractum* A. Cunn. Bat Island 192/1820 Sept, Regents River 132/1821 Aug. N.W. Australia A. Cunningham"; (c) the piece upper left, label attached, "192 3rd Voy Cataph." and (d) lower left, label attached, "192 3rd".



Fig. 139. *Solanum cataphractum* A. Cunn. ex Benth. Drawn from herbarium specimen, Wilson 10703a, collected at Augustus Island, Bonaparte Archipelago, WA (PERTH). $\times \frac{2}{3}$.

Lectotype: I propose that the sheet at BM labelled "*A. Cunningham 132*, Regent River" be designated lectotype. Choice of this material is also supported by Bentham's reference to cultivated material, a drawing of which is at K and is clearly the species with finely divided leaves. The broad leaved, large fruited species from Montague Sound is referable to *S. oedipus* Symon.

Literature

Bentham (1868) 459; Mueller (1882) 96; Ewart & Davies (1917) 242; Fitzgerald (1918) 102.

An erect or sprawling, small dioecious *shrub*, with slender stems; prickles to 5 mm long, fine, pale, straight or slightly pointing downwards, abundant on all parts; growing points and younger parts sparsely pubescent with minute stellate hairs; stems and leaves soon glabrous except for prickles; general aspect green. *Leaves* 3-5 cm long, deeply pinnately parted into 6-14 narrow linear to terete lobes, 2-14 mm long and 1-3 mm wide. *Inflorescence* on the *male* plant an erect cyme finally 3-8 cm long, armed, bearing from 6 to 20 flowers; peduncle gradually lengthening as flowers are produced successively; pedicel c. 5 mm long. *Calyx* tube 2-3 mm long; lobes 2-3 mm long, lanceolate, acumens c. 1 mm long. *Corolla* 2 cm diam., rotate, emarginate, interacuminal tissue exceeding petal tip, giving 10-lobed effect, sparsely pubescent on outside. *Filaments* (Fig. 168) 1-1.5 mm long; anthers 3 mm long, slightly tapered-oblong, perhaps slightly darker towards tips. *Ovary*, style and stigma vestigial and together c. 1 mm long. *Inflorescence* of *female* plant a solitary flower; pedicel c. 8 mm long. *Calyx* tube 3-4 mm long, densely covered with pale prickles 3-5 mm long; lobes 4-5 mm long, linear, green, sparsely prickly. *Corolla* not seen in satisfactory state in one flower available. *Filaments* 1-1.5 mm long, anthers 2-3 mm long, tapered-oblong. *Ovary* 2 mm diam., globular, glabrous; style 4 mm long, erect; stigma bifid, each lobe 1-1.5 mm long. *Berry* (Fig. 158) c. 2 cm diam., colour and texture not known; calyx tube enlarged to cover most of berry. (Fig. 139.)

Chromosome number: unknown.

Notes

This species is inadequately known for a full description to be made. A single male flower from *Wilson 10703a* had six anthers and a single female flower from *Marchant 72/42* also had six anthers.

Distribution (Map 8)

W.A., Kimberley coastline and adjacent islands.

Specimens examined

WESTERN AUSTRALIA: *Cunningham 132*, Aug. 1821, Regents River (BM, K, MEL); *Cunningham s.n.*, 1821, Bat Island (BM, K); *Wilson 10703a*, 13.v.1972, Augustus Island, Bonaparte Archipelago (PERTH); *Marchant 72/42*, 1.iv.1972, Boomerang Bay, Bigge Island, prostrate on coarse sand and sandstone rocks, flowers blue (PERTH).

121. *Solanum carduiforme* F. Muell., Fragm. 2 (1861) 163.

Type citation: "Ad ripas arenosas et rupestres fluvii Nicholson sinus Carpentaria Gulf". 21.viii.1856, *F. Mueller*, Gregory Expedition.

Type material: The material at MEL is now exceedingly scrappy and consists of about 14 fragmentary pieces and the transverse sections of a young fruit. At Kew much better pieces are preserved and this sheet is here proposed as lectotype.

Literature

Mueller (1861) 163; Bentham (1868) 462; Mueller (1882) 96; Bailey (1883) 347; Bailey (1901) 1090; Bailey (1913) 357; Ewart & Davies (1917) 242.

A clonal, dioecious erect *herb* or *subshrub* to 50 cm; prickles to 8 mm long, unequal, straight, yellowish, abundant on all parts; leaves with close, dense, pale tomentum of stellate hairs (sessile or short stalked porrect-stellate with equal central ray). *Leaves* 5-7.5 cm long, lanceolate in outline, pinnatipartite with 3-5 lobes on each side, sinuses cut almost to the midvein, the lobes oblong to broadly triangular, their apex acute, terminal lobe relatively long and narrow, concolorous; petiole 0.5-1.5 cm. *Inflorescence*



Fig. 140. *Solanum carduiforme* F. Muell. Reconstructed from herbarium specimens, Armit 748, from Robertson's River, Qld (MEL 12242-12245). $\times 2/3$.

of male plant a cyme 3-12 cm long with numerous flowers, as flowering proceeds the cyme gradually elongates bearing 1-2 open flowers at a time; pedicel 5 mm long. *Calyx* tube 3-4 mm long, almost truncate; lobes 1-3 mm long, triangular, prickly towards the apex. *Corolla* 2-2.5 cm diam., broadly stellate; lobes rounded and with a small acumen but scarcely emarginate, purple. *Filaments* (Fig. 168) c. 2 mm long; anthers c. 5 mm long, lanceolate. *Ovary*, style and stigma vestigial, 2-5 mm long. *Female flower* solitary; pedicel short. *Calyx* tube c. 7 mm long, densely prickly; lobes 2-5 mm long, unequal, linear, prickly. *Corolla* 2 cm long, broadly stellate; lobes rounded, with a short blunt acumen, purple. *Filaments* c. 3 mm long; anthers c. 4 mm long, lanceolate. *Ovary* 2 mm diam., globular, glabrous; style erect, c. 12 mm long including the bifid stigmatic surface of 2-3 mm. Fruiting peduncle short; *berry* (Fig. 158) c. 2 cm diam., globular, enclosed in calyx tube, densely prickly particularly along the main veins. In both the *Armit* and *Farrell* collections the calyces have 6-7 lobes, orifice small and the calyx lobes not exceeding the prickles. *Seeds* small to 2 mm long reniform-ovate, flattened, finely reticulate, brownish black, 227 counted in one fruit. (Fig. 140.)

Chromosome number: unknown.

Notes

This rare species has just been rediscovered after a lapse of over 130 years. It appears to be extremely localised in its occurrence and Mr Farrell states that only one small colony was seen. It is the eastern most of the dioecious species and its affinities are with those forms of *S. dioicum* found in the Tanami but from which it differs in its deeply lobed leaves, smaller stature and looser tomentum.

Distribution and habitat (Map 11)

North-western Qld, localised near Lawn Hill. Both Armit and Farrell note that it grows on conglomerate rock formations.

Specimens examined

QUEENSLAND: *Hank s.n., s.d.*, Lawn Hill, near Burketown (MEL 12240); *Armit 748, s.d.*, five sheets (MEL 12241-12245), variously labelled Cave Creek and Robertsons River "but only in the conglomerate". *Farrell 922, 14.viii.1979*, Lawn Hill Gorges 14°43', 138°29'. On sandstone/conglomerate above third gorge, 230 m Alt., with *Euc. setosa/brevifolia*, *Triodia* sp., *Grevillea dryandri*, *Calythrix microphylla*. Low shrubs to 1 m, only in slight depressions on flat area (ADW, BRI, CANB, K, MO, NT).

122. *Solanum leopoldensis* Symon. Trans. & Proc. Roy. Soc. S. Aust. 95 (1971) 231.

Type citation: D.E. Symon 7040, 26.v.1971, from rocky gully cleft at the base of Bold Bluff, King Leopold Ranges, Western Australia. "A dark green spreading fruit-bearing plant". Approximate Lat. 17°17'S, Long. 125°25'E.

Holotype: PERTH. *Isotype*: ADW, CANB, K, L, NT.

An intricate, spreading, dioecious *shrub* 0.5-1 m high 1-1.5 m wide forming small colonies; prickles 1-6 mm long, abundant on stems, upper and lower leaf surfaces, peduncles, pedicels, and calyx, straight or slightly recurved, slender, pale coloured; leaves with minute, stellate hairs (sessile porrect-stellate, central ray short or absent), minute, simple, glandular hairs also present, sometimes dense below, sparse above, general aspect green. *Leaves* (2-) 5 (-8) x (1-) 1.5 (-3) cm, lanceolate, with (7-) 9 (-13) triangular lobes fairly evenly spaced along margin, sinuses rounded, cut one third of way to midrib, lobe and leaf apex acute or acuminate, base cuneate, equal or oblique; petiole to 5 mm long. *Inflorescences* consist of solitary female flowers and cymes of male flowers on separate plants. *Male flowers* in cyme of up to 11 flowers from extra-axillary position; peduncle to 3 cm long; floral rhachis 2-3 cm long; pedicel 5-8 mm long, slender. *Calyx* tube short and open; lobes 5 mm long, bluntly triangular to lanceolate, sometimes several fused together; tips 1-2 mm long, linear. *Corolla* 1.5-2.5 cm diam., broadly stellate-rotate, pubescent on the petals outside, interacuminal tissue glabrous.

Filaments (Fig. 168) 1.5-2 mm long; anthers 4.5-5 mm, narrow-oblong. *Ovary*, style and stigma vestigial, 3-5 mm long. *Female flower*: pedicel 1-1.5 cm long. *Calyx* tube c. 3 mm long; lobes 8-11 mm long, long-triangular including the linear apex, midvein prominent, all extremely prickly. *Corolla* 3-3.5 cm diam., broadly stellate-rotate, sinuses cut about $\frac{1}{4}$ to $\frac{1}{3}$ of petal length, apex rounded to sub-emarginate, densely minutely pubescent



Fig. 141. *Solanum leopoldensis* Symon. Drawn from pot grown plant at the Waite Institute, from seed from Symon 5318, collected 21 km from Inglis Gap on the north side of the King Leopold Ranges, WA (ADW 40503 and 40504). Upper left, female; lower right, male. $\times \frac{2}{3}$.

along the mid portion, acumen 1-1.5 mm distinct, lavender. *Filaments* 2 mm, glabrous; anthers 5 mm long, tapering, closely erect. *Ovary* glabrous; style c. 9 mm long; stigma bifid, lobes 1-1.5 mm long, projecting 2 mm beyond anther tips. *Berry* (Fig. 158) 1.5-2 cm diam., depressed-globular, green when mature, finally pale brown, some drying on bush to hard bony texture, partially or wholly enclosed in prickly, accrescent, truncate calyx tube which has prickly linear lobe tips 0.5-1 cm long. *Seeds* 1.5-2 mm long, distinctly, minutely reticulate, dark brown, 289 and 583 in two fruits examined. (Fig. 141.)

Chromosome number: $n = 12$ Randell & Symon (1976) and, in addition, Symon 5318 and 7151 have also been counted as $n = 12$.

Notes

The species is not variable though the number of collections seen is limited. However, as it is a dioecious species the male and female inflorescences are rather different. Its relationships with Australian species are obscure. Superficially the species is most closely related to *S. oedipus* and has similarly abundant pale prickles, a green aspect, and minute stellate tomentum. However, *S. leopoldensis* is a more intricate shrub, is dioecious, not andromonoecious, and differs in its calyx and seed characters.

Distribution and habitat (Map 2)

W.A., King Leopold Ranges and adjacent areas where this species is restricted in distribution and found in the rocky gullies and creeklines.

Selected specimens (total seen about 10)

WESTERN AUSTRALIA: Symon 5318, 24.vi.1967, 21 km from Inglis Gap on the N side of the King Leopold Ranges (ADW, B, CANB, K, L, NSW, PERTH); Beaglehole 47800, 22.vii.1974, Lennard River Gorge (acb, ADW).

123. *Solanum asymmetriphyllum* R.L. Specht, Rec. Americ. Austr. Sci. Exped. Arnhem Land 3 (1958) 293.

Type citation: "Sandstone Hills, Oenpelli, Northern Territory, R.L. Specht 1143 and Stewart James, 7 March 1951".

Holotype: BRI. *Isotypes*: AD, CANB, K, L.

Solanum asymmetriphyllum R.L. Specht var. *longiflorum* R.L. Specht, Rec. Americ. Austr. Sci. Exped. Arnhem Land 3 (1958) 295.

Type citation: Sandstone hills, Oenpelli, Northern Territory R.L. Specht 1143A.

Holotype: BRI. *Isotypes*: AD, CANB, K, L.

Note: This is a dioecious species and the variety *longiflorum* was based on a female plant. The type collections represent mature twigs and the leaves are smaller than many plants found in the field.

An erect, clonal dioecious *shrub* 1-3 m tall, branching above, stems lasting several seasons where protected, young stems armed, older ones less prickly, with corky bark, in protected sites main stem to several centimetres in diam.; prickles to 8 mm long, unequal, sparse or absent on stem, abundant or sparse on fruiting calyx, absent or rare on petioles, leaves; lower leaf surface with close, dense, silvery tomentum of stellate hairs (short stalked pectinate-stellate with short or medium central ray), leaves green and almost glabrous above, some hairs along veins; general aspect of leaves markedly discoloured. *Leaves* (7-) 15 (-25) x (2-) 5 (-17) cm, elliptic to ovate-elliptic, entire, when plant vigorous with 5-7 shallow angular lobes, sinuses shallow and rounded, lobes and leaf apices acute, base cuneate or rounded very oblique; petiole 1-2 (-6) cm long, generally unarmed, leaves on old twigs markedly smaller than those on young. *Inflorescences* of solitary female flower or compound cymes of male flowers on separate plants. *Female flower*: pedicel 1-1.5 cm long, unarmed. *Calyx* tube c. 5 mm

long, fine prickly; lobes 2-3 mm long, triangular, with acumen 3-5 mm long, midvein well developed to give angular calyx tube. *Corolla* 4-6 cm diam. (one of largest Australian *Solanum* flowers), rotate, purple-blue, interacuminal tissue well developed, exceeding petal tip, acumens 2-5 mm long, linear, distinctive and striking. *Filaments* (Fig. 168) 1-2 mm long, anthers 7-8 mm long, in erect, loose cone, upper 2-3 mm distinctly attenuate. *Ovary* 3 mm long, oblong; style 1 cm long, exceeding anthers by 2-3 mm; stigma 3 mm long, linear, green. *Inflorescence of male flowers* a branched cyme of 40-60 flowers, first congested, gradually lengthening; peduncle c. 5 cm long to first flower; floral rhachis of several cm with to 5 initially short branches, gradually



Fig. 142. *Solanum asymmetriphyllum* Specht. Male plant drawn from herbarium specimen, Symon 7173, from East Alligator River, NT (ADW 39137). $\times 2/3$.

lengthening during flowering period; pedicel 5-8 mm long. *Calyx* somewhat bilabiate, lobes 2-3 mm long, rounded, short acumens 0.5-1 mm long, unarmed. *Corolla* 2.5-3 cm diam., broadly stellate-rotate, interacuminal tissue not exceeding petal tip which is continued into a distinct acumen 1-3 mm long. *Filaments* very short; anthers 5-6 mm long, oblong-tapering, erect in cone. *Ovary* and style vestigial, together 1-2 mm long. Fruiting pedicels c. 2 cm long, nutant, not greatly enlarged, thickened; calyx 2-3 cm diam., accrescent, membranous, prickly, pubescent with minute stellate hairs, closely and almost completely covering fruit; *berry* (Fig. 158) 2-3 cm diam., globular, mature



Fig. 143. *Solanum asymmetriphyllum* Specht. Female plant drawn from pot grown plant at the Waite Institute, from Symon 5154; roots collected from rocks adjacent to the East Alligator River Crossing on the road to Oenpelli, NT (ADW 36658). $\times \frac{2}{3}$.

fruit shining green, finally blackening. *Seeds* 2.5-3 mm long, dark brown, minutely reticulate, 8 fruits from *Symon 7180* had (302) 429 (639) seeds per fruit. *Cotyledons* c. 10 x 4 mm, lanceolate, minutely glandular-ciliate, hypocotyl glandular-hispid, first true leaf 7 x 5 mm, ovate, with stiff, purple, prickly-like hairs, aspect dark purple-green. In cultivation young plants are strictly erect and unbranched until they reach flowering size in the first season. (Figs 142 and 143.)

Chromosome number: $n = 12$ Randell & Symon (1976) and in addition *Symon 5157* was also $n = 12$.

Notes

This handsome dioecious species is well separated from those in the Kimberleys. It is the largest of the group and does not appear to be closely related to them, no andromonoecious ancestor is apparent.

Distribution (Map 9)

N.T., on rocky outcrops on the north-western scarp of the Arnhem Land plateau.

Selected specimens (total seen about 25)

NORTHERN TERRITORY: *Symon 5154*, 11.vi.1967, rocks adjacent to the East Alligator River Crossing to Oenpelli (AD, ADW, CANB); *Symon 5157*, 11.vi.1967, large rocky outcrops 16 km SW of East Alligator River Crossing to Oenpelli (ADW, B, BRI, K, NSW, NT); *Byrnes 813*, 18.v.1968, 13 km N of Mudginberry Homestead, among sandstone rocks, shrub to 2 m, flowers blue, main stem armed (ADW, DNA); *Symon 7173*, 8.vi.1971, rocks adjacent to the East Alligator River Crossing to Oenpelli, vigorous plant growing out of a hollow in a Eucalyptus tree about 1.5 m from ground (ADW, B, CANB, K, NT); *Symon 7178*, 8.vi.1971, 11 km W of the East Alligator River Crossing on the road to Oenpelli, large shrub 2 m, up on rocky outcrop, fruiting heavily (AD, ADW, B, BRI, CANB, K, L, MEL, NSW, NT, PERTH); *Symon 7180*, 8.vi.1971, 14 km W of the East Alligator River Crossing on the road to Oenpelli, shrubs to 2 m at the base of rocky outcrops (ADW); *Symon 7992*, 29.vi.1972, 16 km S of East Alligator Crossing on road to Oenpelli, shrub to 2 m at the base of rocky outcrops (ADW).

124. *Solanum tudununggae* Symon, sp. nov.

Suffrutex 2 m altus, erectus, tenuis. *Aculei* usque 6 mm longi, recti, inaequales, pallidi, in caulis et alibi sparsi. Omnes partes pilis stellatis pallidis confertim pubescentes. *Folia* 15-25 x 6-15 cm, ambitu ovata usque elliptica, pinnatilobata lobis linearibus, sinubus profundis. *Folia* demum lobis redacta et interdum linearia; ad aspectu generali incano plus minusve discolori. *Inflorescentia* plantae masculae cymosa 12-20 floribus; pedunculus 1-2 cm longus; pedicellus 5 mm longus; calyx circa 4 mm, fere truncatus sparse aculeatus; lobi calycis obtuse triangulares; *corolla* 3-4.5 cm diam. late stellata, lobis truncatis, heliotropina; filamenta brevissima; antherae 8-9 mm longae, tenues, oblong-lanceolatae; ovarium et stylus vestigialis. *Inflorescentia* hermaprodita solitaria; pedicellus 2 cm longus; calyx 5-7 mm diam. globularis, lobis 1-2 cm inaequalibus linearibus; *corolla* usque 5 cm diam. late stellata; filamenta brevissima; antherae 1 cm longae, lanceolatae, tenues laxae erectae; ovarium globulare, pilis glandulosis sparsim vestitum; stylus usque 2 cm, erectus, pallidus; stigma papillosum, virides. Fructus in pedicello brevi erectus; calyx 1.5-2 cm diam. globularis baccam includens, subcoriaceus, sparsim aculeatus; lobi calycis breves, acuminibus 1 cm longis linearibus. *Bacca* 2 cm diam. viridis, in calyce maturescens basi circumscissa, sed in calyce remanens, seminibus per orificium spargentibus. Semina 2.5-3 mm long, complanata, sub-reniformia, minime reticulata, nigra.

Typus: *D.E. Symon 10201*, 27.v.1975, Western Australia, Kimberley Division, Kalumburu Mission. Across the King Edward River and about 1.6 km upstream. $\pm 14^{\circ} 16' 126^{\circ} 38'$. "Tall erect 2-2.5 m sparsely branched, on flat quartzite slabs with little sand and grass. Fruits erect, seem to scatter seed from the fruits like a poppy". PERTH (holotypus); ADW, CANB, K. (Fig. 136.)

A slender, erect, sparsely branched dioecious *shrub* to 2 m high, not known to be clonal, apparently not long lived; prickles to 6 mm long, straight, unequal, pale, sparse on stems, a few on petiole midvein of leaf and calyx tube; all parts covered with close, dense, pale tomentum of stellate hairs, (short or long multiserial stalked, porrect-stellate with medium or long central ray). *Leaves* to 15-25 x 6-15 cm, ovate to elliptic, deeply pinnatisect, 2-4 lobes on each side, lobes 0.4-3.5 (-17) x 0.3-0.5 (-1) cm, linear, sinuses deep and rounded, lamina 5-8 mm wide between lobes, leaf and lobe apices acute, base equal or

oblique, leaf base tapered, petiole 1-2 (-5) cm long, later leaves on mature flowering stems with reduced lobes and sometimes linear-lanceolate, 15 x 1 cm, veins conspicuous below, general aspect grey-green, leaves somewhat discoloured, slightly paler below. *Inflor-escence* of *male* plants a cyme of 12-20 flowers; peduncle 1-2 cm long, apparently not lengthening much during flowering; floral rhachis 2-4 cm long; pedicel 5 mm long.



Fig. 144. *Solanum tudumunggae* Symon. Female plant drawn from pot grown plant from roots collected near the Benedictine Mission, Kalumburu, WA (ADW 53783). $\times \frac{2}{3}$.

Calyx c. 4 mm long, almost truncate, with few prickles, lobes bluntly triangular, acumens 0.5-1 mm long. *Corolla* 3-4.5 cm diam. (at least 1.5 cm long) broadly stellate, lobes truncate, acumens 2 mm long, faintly sweetly scented, colour close to RHS Heliotrope 636/1. *Filaments* (Fig. 168) short; anthers 8-9 mm long, oblong-lanceolate, rather slender. *Ovary* and style vestigial. *Female flowers*; solitary, pedicel to 2 cm long. *Calyx* 5-7 mm diam., globular; lobes 1-2 cm long, unequal, linear. *Corolla* to 5 cm diam.,

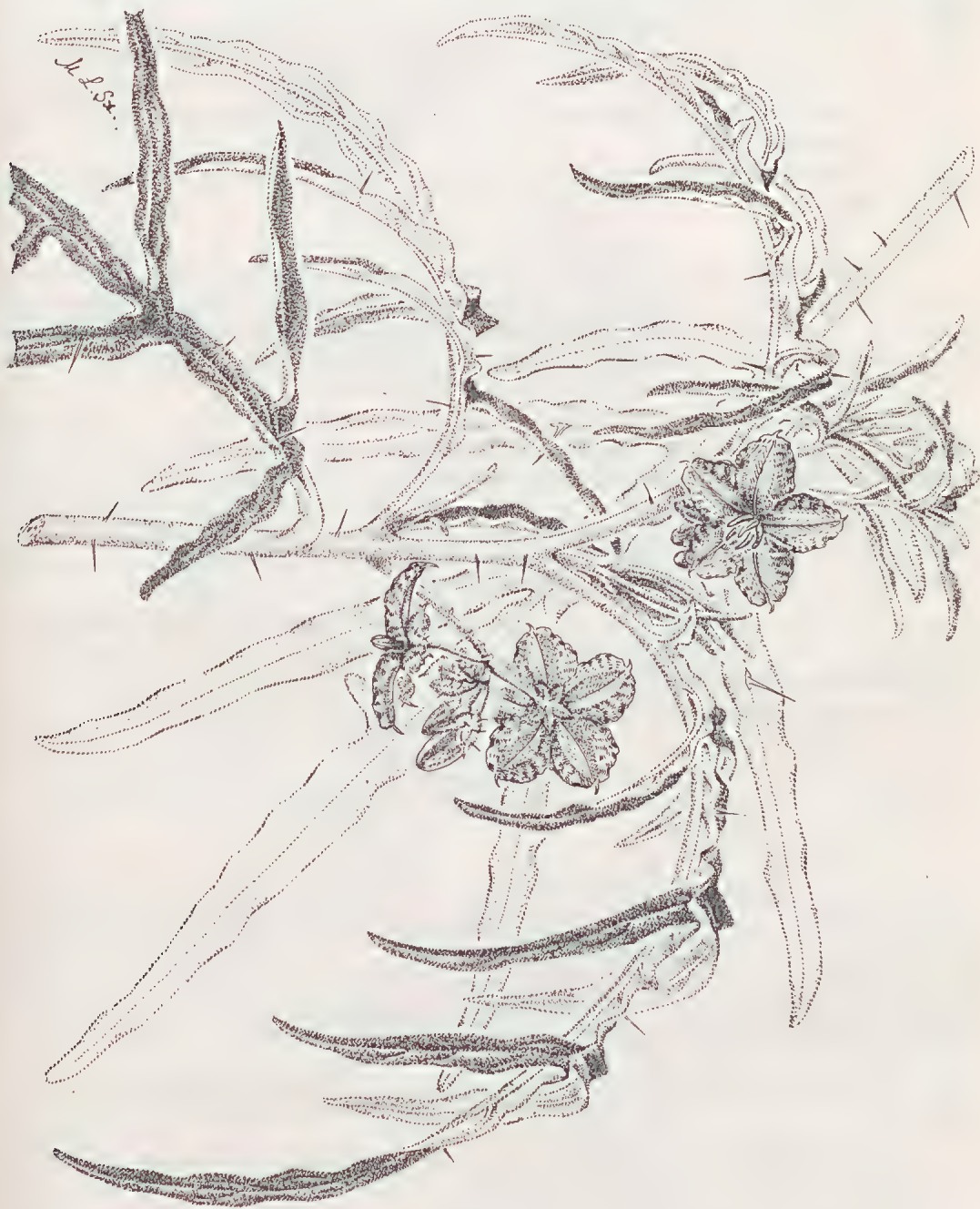


Fig. 145. *Solanum tudununggae* Symon. Male plant, source as in Fig. 144 (ADW 53784). $\times \frac{2}{3}$.

broadly stellate, interacuminal tissue well developed, lobe apex truncate, acumen 5 mm long. *Filaments* short; anthers to 1 cm long, lanceolate, slender, loosely erect. *Ovary* globular, sparsely glandular hairy; style to 2 cm long, erect, pale; stigma papillose, green, decurrent on style for 5 mm, projecting beyond anther tips 5 mm. Fruit produced towards top of slender stems on short, spreading, erect, firm pedicels 2-15 mm long; calyx 1.5-2 cm diam., globular, enclosing berry, firm almost coriaceous, with scattered prickles to 6 mm long, with close, dense, pale tomentum, lobes short, acumens to 1 cm long, linear; *berry* (Fig. 158) to 2 cm diam., shining-green or flushed purple where exposed, drying within calyx, circumscissile towards base, remaining as a loose cap within calyx and allowing seeds to be scattered through orifice of calyx, (a bizarre method of seed dispersal in *Solanum*). *Seeds* 2.5-3 mm long, flattened, irregularly subreniform, minutely reticulate, black. (Figs 144 and 145.)

Chromosome number: $n = 12$ Randell & Symon (1976), as "sp. nov. No. 4", Kalumburu, Symon 10202.

Notes

This unique *Solanum* has only been collected from two sites, close together and near Kalumburu Mission. Its slender erect habit, distinct leaves and unique seed scattering mechanism separate it from all other Australian solanums. On the back of the corolla, mainly near the midrib and towards the apex, are a number of glands which exude a clear nectar. This is avidly collected by both ants and honey-bees.

The species does not appear to have any close relatives but could have distant affinities with *S. sturtianum* which is widely spread through the arid areas of Australia from the eastern Hamersleys to Broken Hill. *Solanum sturtianum* has oblong (to linear) leaves, never deeply lobed, close, dense, pale tomentum, a generally erect sometimes slender habit, erect fruits not enclosed in the calyx on short pedicels, much larger dark seeds, a rotate corolla, and is also well attended by ants. In contrast to the dioecy of the new species, *S. sturtianum* is hermaphrodite.

The new species is named in honor of Mary (Tudunung-ga) Pantilow of Kalumburu Mission who at pain to herself led us to a major population of the species (Symon 10201-10202) after much searching by the author.

Distribution and habitat (Map 1)

W.A., Kimberley Division on the banks of the King Edward River close to Kalumburu Mission. Collected from shallow sandy soils over quartzite bedding rocks in areas that may be seasonally wet but not so in the dry season. A few plants have been collected from sandy terraces of the river.

Specimens examined

WESTERN AUSTRALIA: *Broadbent* 539, 19.xii.1952, Kalumburu, W side of King Edward River. Sandy soil near river, tall herb 1.5-2 m (BM); *Symon* 7128, 29.v.1971, Kalumburu, as above, leafy specimen only (ADW); *Symon* 10181, 26.v.1975, Kalumburu, 3 km S of the Mission. Sandy wash over basalt/quartzite flat waterway. Many young plants but all grazed. Specimens grown from roots from this collection have been widely distributed (ADW, B, BRI, DNA, K, L, MO, NSW, NT, PERTH); *Symon* 10201, 27.v.1975, Kalumburu, W side of King Edward River about 2 km upstream. On flat slabs of quartzite with little sand and grass. Tall erect slender plants to 2-2.5 m, fruiting specimens (ADW, CANB, K, PERTH); *Symon* 10202, 27.v.1975, as above—male plants (ADW.).

125. *Solanum vansittartensis* C.A. Gardner, Western Australian For. Dept. Bull. 32 (1923) 89.

Type citation: "Four to eight miles south of Vansittart Bay, on sandstone elevations in sandy soil among rocks. Fl. m. June-August".

Holotype: PERTH. The sheet at Perth bears the additional information "No. 1516 *Solanum Vansittartensis*, Gardner, Vansittart Bay, C.A. Gardner, 7.8.1921, the type".

Dioecious *shrub*, erect, sparsely branched or simple stem 2 (-3) m high; all parts pubescent with soft, dense tomentum of stellate hairs (long multiseriate-stalked, porrect-stellate with long central ray); prickles to 1 cm, pale straw colour, scattered on stem and petiole, absent from leaf blade, abundant on fruiting calyx. *Leaves* to 10 x 6 cm, ovate, entire, apex acute, base subcordate or rounded, oblique, upper leaves to narrow-lanceolate (type),



Fig. 146. *Solanum vansittartensis* C.A. Gardner. Male plant drawn from herbarium specimen, *Smith s.n.*, collected along Mitchell River-Camp Creek intereseect, Mitchell Plateau, WA (ADW, PERTH). $\times \frac{2}{3}$.

base broadly cuneate; petiole 0.5-2 cm. *Inflorescence* of the *male flowers* a condensed cyme of at least 12 flowers; peduncle to first flower c. 1 cm; floral rhachis may lengthen as successive flowers are shed; pedicel c. 5 cm. *Calyx* 1 cm long, tube short 2-3 mm; lobes lanceolate 5-7 mm long. *Corolla* c. 2.5 cm diam., broadly stellate to pentagonal. *Filaments* very short; anthers c. 7 mm, linear, tapered upwards. *Female flower* not seen; bud virtually sessile. *Calyx* tube c. 1 cm long, the lobes linear c. 1 cm. Fruit sessile or on short pedicel c. 5 mm; calyx tube enlarged c. 2.5 cm diam., completely covering the berry, densely pubescent; prickles to 1 cm abundant; lobes 2 cm, long triangular at the base,



Fig. 147. *Solanum vansittartensis* C.A. Gardner. Female plant drawn from herbarium specimen, *Kenneally* 4793, collected Camp Creek, Mitchell Plateau WA (PERTH). $\times \frac{2}{3}$.

tapering to linear non-prickly apex; *berry* (only seen dry) (Fig. 158) lower portion adherent to calyx tube, at maturity upper portion circumscissile and the shrunken remains act as a loose plug at the orifice of the calyx, the seeds are scattered with a censer like action from the willowy stem. *Seeds* 2.5 mm long, subreniform minutely reticulate, black, numerous. (Figs 146 and 147.)

Chromosome number: unknown.

Notes

This rare species has only recently been recollected and the two new collections differ from the type in their rather broader leaves. Although differing greatly from *S. tudununggae* in leaf characters this species has a similar willowy habit, sparse branching and extraordinary method of seed dispersal.

Distribution and habitat (Map 11)

W.A., Mitchell Plateau and Vansittart Bay, north-western Kimberleys. The three collections have come from sandy patches over sandstone.

Specimens examined

WESTERN AUSTRALIA: *Gardner 1516*, see type citation (PERTH); *Kenneally 4793*, 13.vi.1976, Camp Creek, Mitchell Plateau 14°52' 125°46'. Erect, spindly, semi woody shrub to 2 m. Flower blue. Very common in patches of sand on sandstone (Fruiting female plant) (ADW, CANB, PERTH); *Smith s.n.*, 20.xi.1978, Mitchell River-Camp Creek intersect, growing in sandstone, shrub to 2 m flower purple, common (male and immature female plants) (ADW, PERTH).

Species excluded

Solanum aculeastrum Dunal

This shrubby African species was once grown about Brisbane. I have seen no recent collections nor any indication it is naturalised.

Specimens examined

QUEENSLAND: *Simmonds s.n.*, 3.x.1887 Victoria Park (BRI); *Simmonds s.n.*, Oct. 1887, Brisbane (BRI); *Rowney s.n.*, Aug. 1906, Cleveland (BRI); *White s.n.*, Sept. 1915, Woolangabba Park (BRI); *White s.n.*, 23.x.1915, Sandgate, Moreton Bay (BRI).

Solanum capense Thunb.

Drummond (1840) reports introducing this species to W.A. and states that within ten years it was naturalised. No specimens have been seen and it may possibly have been a misidentification of *S. hermanni* L.

Solanum indicum L.

Hooker (1860) recorded this as a species of Indian origin that occurred in Australia. Hepper (1978) considers the name ambiguous, widely misapplied and that the type is in fact *S. ferox* L. However *S. ferox* L. has only recently been found in Australia, and I do not know to which species Hooker was referring.

Solanum juvenale Thell.

It was suggested by Thellung that this species which he considered related to *S. cinereum* R. Br. might be an Australian species adventive in southern France. It has been shown by Symon (1970) to be a South American species.

Solanum lunatum Drummond

Drummond (1840) reports finding this species on Garden Island, W.A. and states that it was plentiful about Perth. I know of no other records or reports.

Solanum lycopersicum L.

This species is now more usually placed in the genus *Lycopersicon* Mill. The genus is extremely closely related to *Solanum*. Utilitarian considerations and a few technical morphological characters support its separation. The name was used for Australian plants by Domin, *Biblioth. Bot.* 89 (1929) 1126.

Solanum pyracanthon Jacq.

Bailey (1878) 2 reported that this species was cultivated as an ornamental in Qld and that it had spread into pasture. I have seen no recent collections suggesting that it is naturalised. At BRI is a collection *White s.n.*, Feb. 1907, Bowen Park, with no other details.

Solanum shanesii F. Muell., *Fragm.* 7 (1868) 144.

Type citation: "Ad rivulos montium prope Rockhampton; Dallachy and O'Shanesy".

Type material: The sheet MEL 12403 is labelled—

- (a) *Solanum shanesii* Ferd. Muell. Rockhampton
- (b) 435 *Solanum* fruit red 17th March 1868.
- (c) *Solanum shanesii* Ferd. Muell. Rockhampton, Dallachy.

The sheet MEL 12404 is labelled "No. 6 ser. 1 *Solanum* erect and slender 6-8 feet bark light coloured and slightly blistered, berry shining red $\frac{1}{2}$ " diameter, 2 celled, rare. Rockh. O'Shanesy 25/2/68, not prickly". At K is a sheet labelled, "*Solanum shanesii* F. Muell. Rockhampton Dallachy Herb. F. Mueller 1868". The specimens have sparse simple pubescence below and are a species of *Capsicum* (see Symon, 1981).

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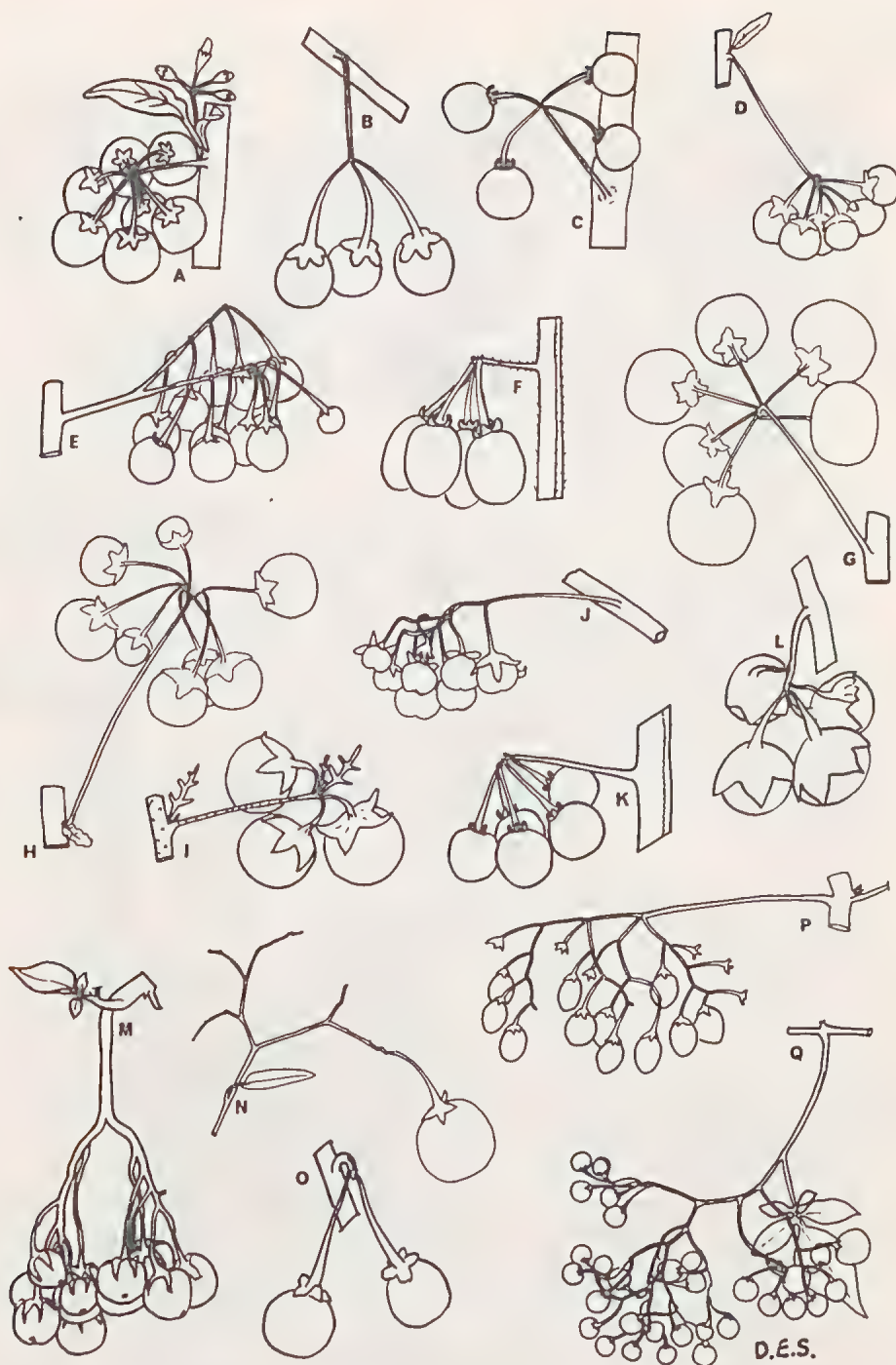


Fig. 148. *Solanum* fruits. A, *S. nigrum* (Feuerheerdt s.n., ADW 12114); B, *S. opacum* (Beaublehole 33110, ADW); C, *S. americanum* (Symon s.n., ADW 35921); D, *S. chenopodioides* (Symon s.n., ADW 35876); E, *S. furcatum* (Symon s.n., ADW 43730); F, *S. villosum* (Symon s.n., ADW 35909); G, *S. scabrum* (Dept Agric s.n., ADW 48417); H, *S. douglasii* (Symon s.n., ADW 35847); I, *S. triflorum* (Martenz 76, ADW); J, *S. palitans* (Salasoo 3061, ADW); K, *S. retroflexum* (Symon s.n., ADW 41010); L, *S. sarrachoides* (Paton s.n., ADW 44794); M, *S. tuberosum* (Symon s.n., ADW 46238); N, *S. jasminoides* (Symon 7843, ADW); O, *S. callium* (Swan 68, ADW); P, *S. dulcamara* (Gaasenbeek s.n., ADW); Q, *S. seaforthianum* (Symon 4754, ADW).

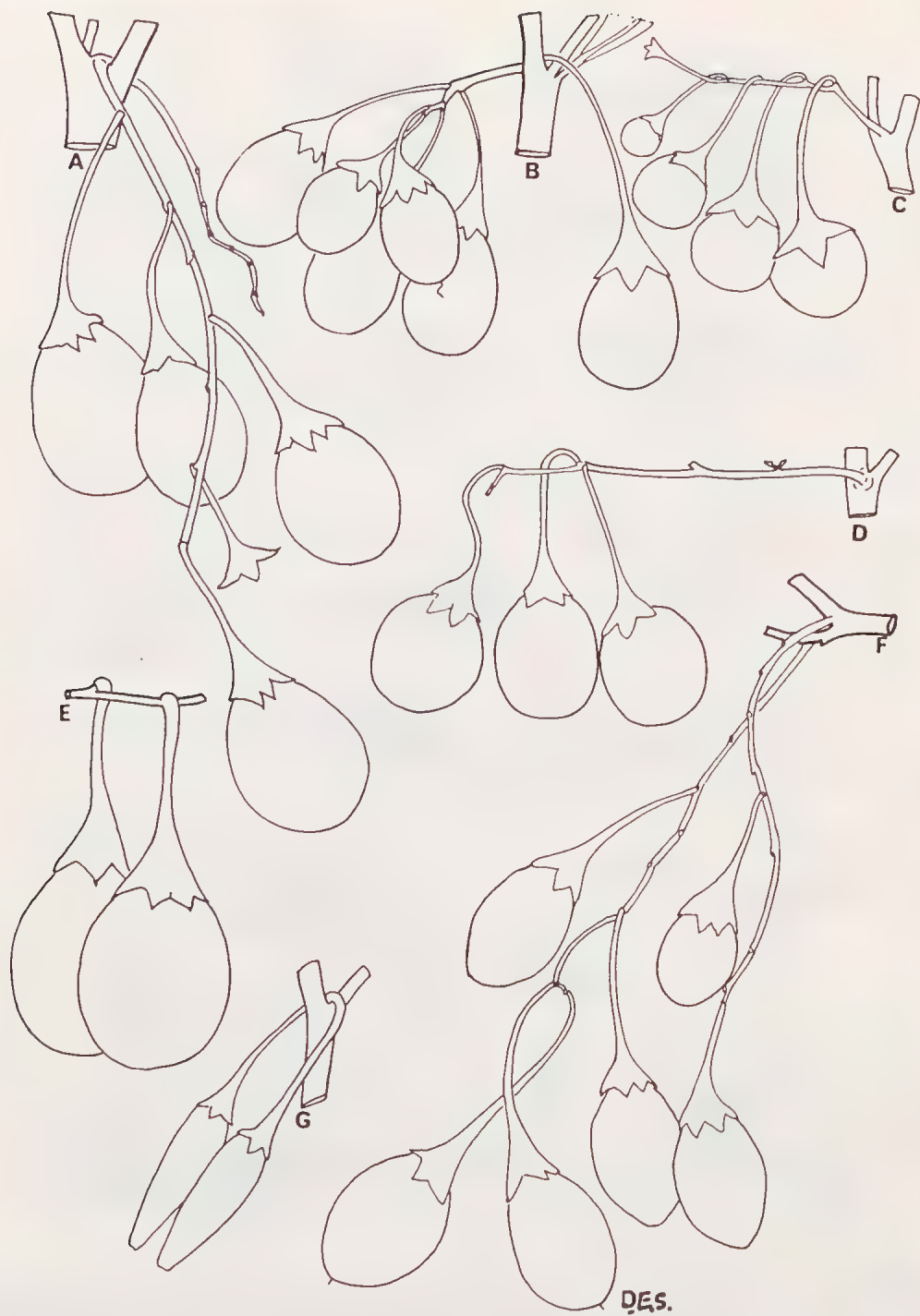


Fig. 149. *Solanum* fruits. A, *S. laciniatum* (Symon s.n., ADW 38718); B, *S. symonii* (Symon s.n., ADW 40864); C, *S. simile* (Symon 884, ADW); D, *S. linearifolium* (Symon s.n., ADW 48382); E, *S. vescum* (Symon s.n., ADW 38772); F, *S. aviculare* (Symon s.n., ADW 40816); G, *S. capsiciforme* (Burford s.n., ADW 32651).



Fig. 150. *Solanum* fruits. A, *S. pseudocapsicum* (Symon s.n., ADW 32944); B, *S. rostratum* (Amtsberg s.n., ADW 34505); C, *S. viride* (Webb & Tracey 8351, ADW); D, *S. viride* (Symon 4753, ADW); E, *S. giganteum* (Symon 6722, ADW); F, *S. torvum* (Symon 4743, ADW); G, *S. hispidum* (Symon s.n., ADW 32972); H, *S. mammosum* (Kelly s.n., ADW 44578).

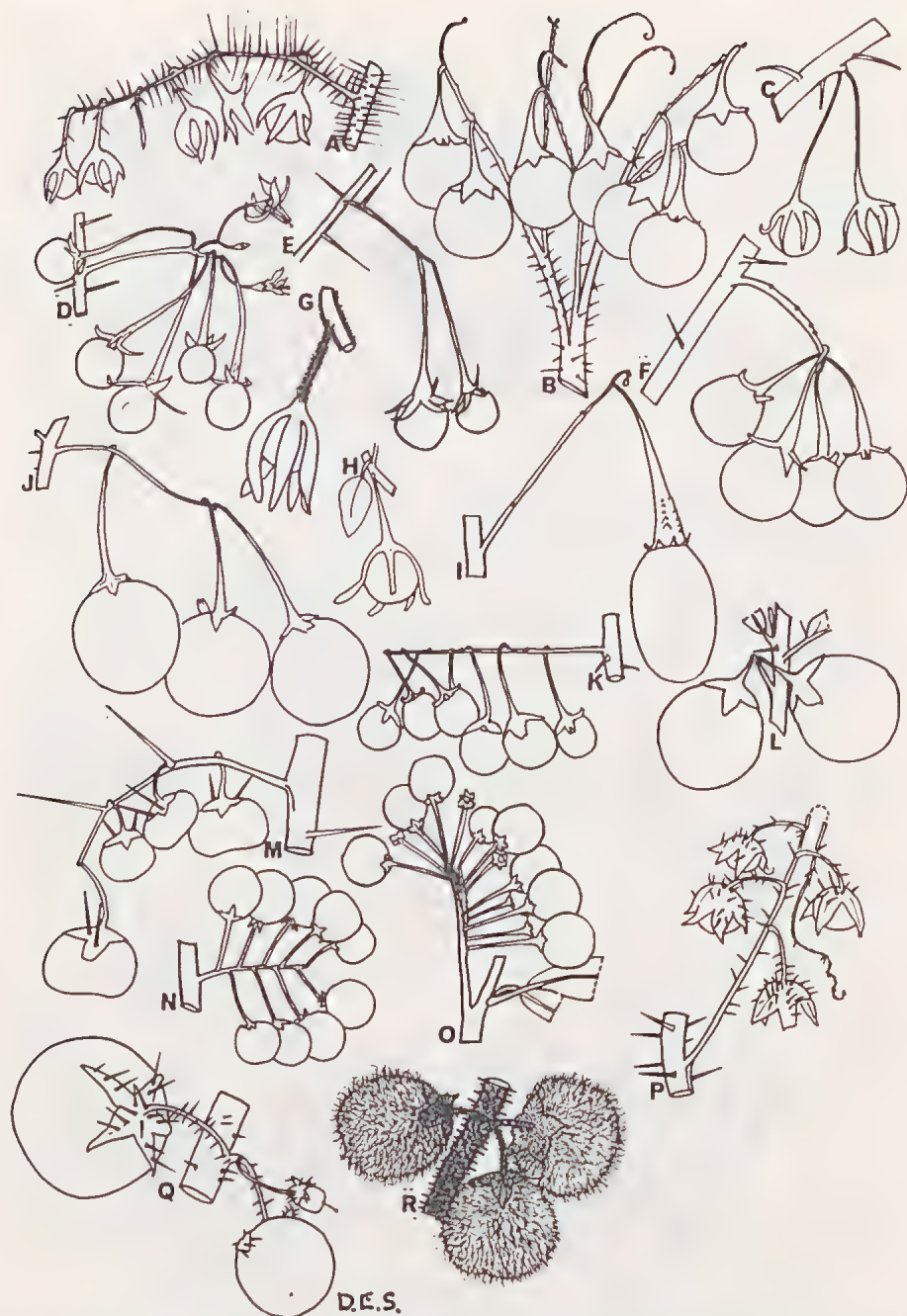


Fig. 151. *Solanum* fruits. A, *S. semiarmatum* (Tracey s.n., ADW 36026); B, *S. semiarmatum* (Symon s.n., ADW 38397); C, *S. stelligerum* (Constable s.n., ADW 37137); D, *S. parvifolium* (Symon s.n., ADW 47944); E, *S. ferocissimum* (Symon s.n., ADW 42310); F, *S. corifolium* (Symon s.n., ADW 43464); G, *S. densevestitum* (Tracey s.n., ADW 36667); H, *S. nemophilum* (Moriarty s.n., ADW 46276); I, *S. discolor* (Symon s.n., ADW 48381); J, *S. yirrkalensis* (White s.n., ADW 48359); K, *S. chenopodinum* (Symon 5972, ADW); L, *S. elegans* (Everist 7142, ADW); M, *S. pugiunculiferum* (Symon 4706, ADW); N, *S. tetrandrum* (Stocker s.n., ADW 32928); O, *S. dunalianum* (Swan 141, ADW); P, *S. sisymbriifolium* (Symon s.n., ADW 28110) $\times \frac{1}{3}$; Q, *S. capsicoides* (Symon 4711, ADW) $\times \frac{2}{3}$; R, *S. ferox* (Moriarty 1683, ADW) $\times \frac{2}{3}$.

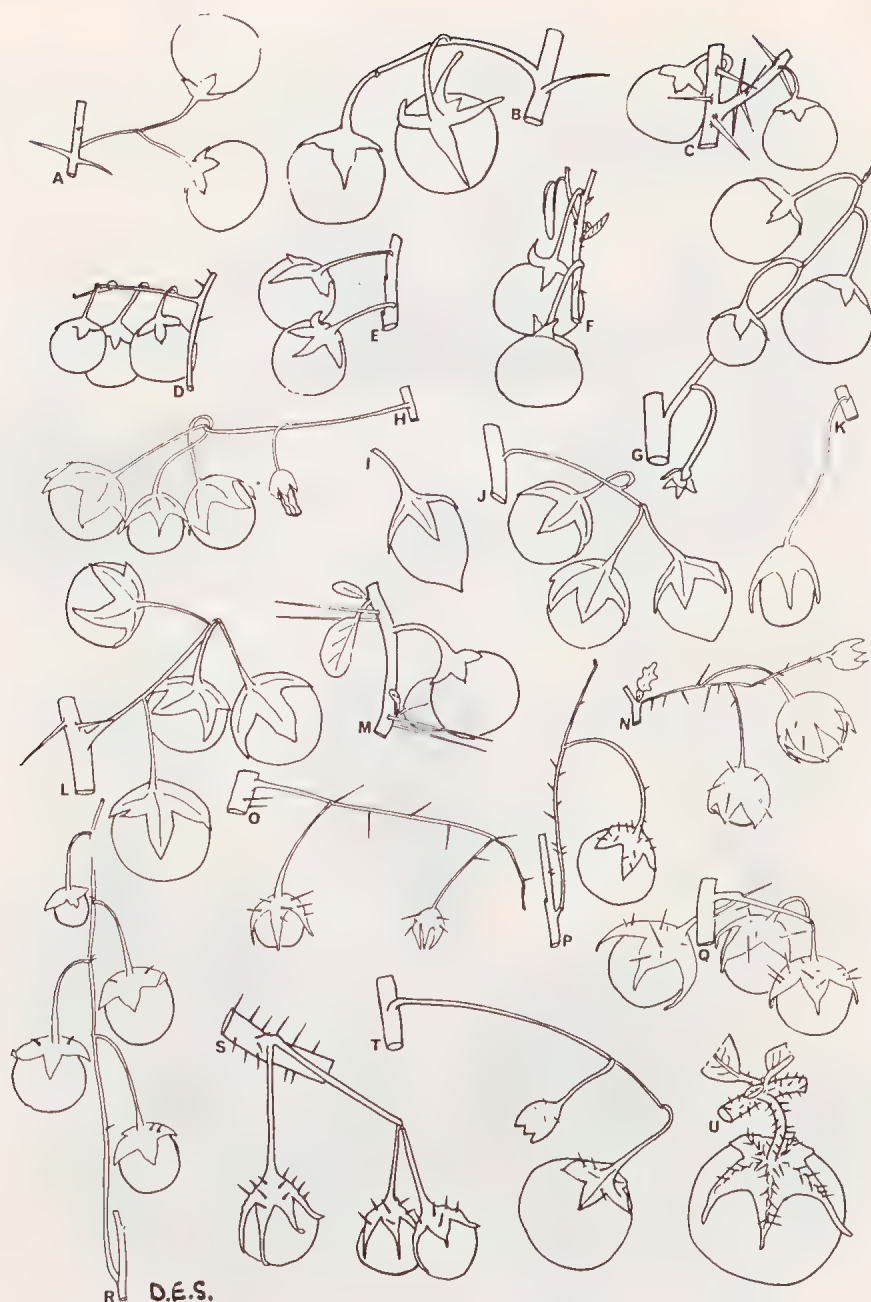


Fig. 152. *Solanum* fruits. A, *S. orbiculatum* ssp. *orbiculatum* (Symon 3420, ADW); B, *S. orbiculatum* spp. *macrophyllum* (Smith-White s.n., ADW 33384); C, *S. nummularium* (Symon 5478, ADW); D, *S. oldfieldii* (Ashby s.n., ADW 12779); E, *S. plicatile* (Symon 5475, ADW); F, *S. coactiliferum* (Briggs 2788, ADW); G, *S. centrale* (Beaughtole 23154, ADW); H, *S. esuriale* (Symon 9826, ADW); I, *S. esuriale* (Burford 49, ADW); J, *S. tumulicola* (Latz 458, ADW); K, *S. terraneum* (Symon 9932, ADW); L, *S. tetrathecum* (Symon s.n., ADW 36728); M, *S. elachophyllum* (Johnson 2874, ADW); N, *S. eremophilum* (Morris s.n., ADW 12706); O, *S. adenophorum* (Symon s.n., ADW 46384); P, *S. papaverifolium* (Gidley s.n., ADW 38147); Q, *S. dianthophorum* (Symon 5512, ADW); R, *S. lacunarium* (Baker s.n., ADW 46335); S, *S. cleistogamum* (Symon s.n., ADW 38514); T, *S. ellipticum* (Symon 6770, ADW); U, *S. horridum* (Symon 5403, ADW).

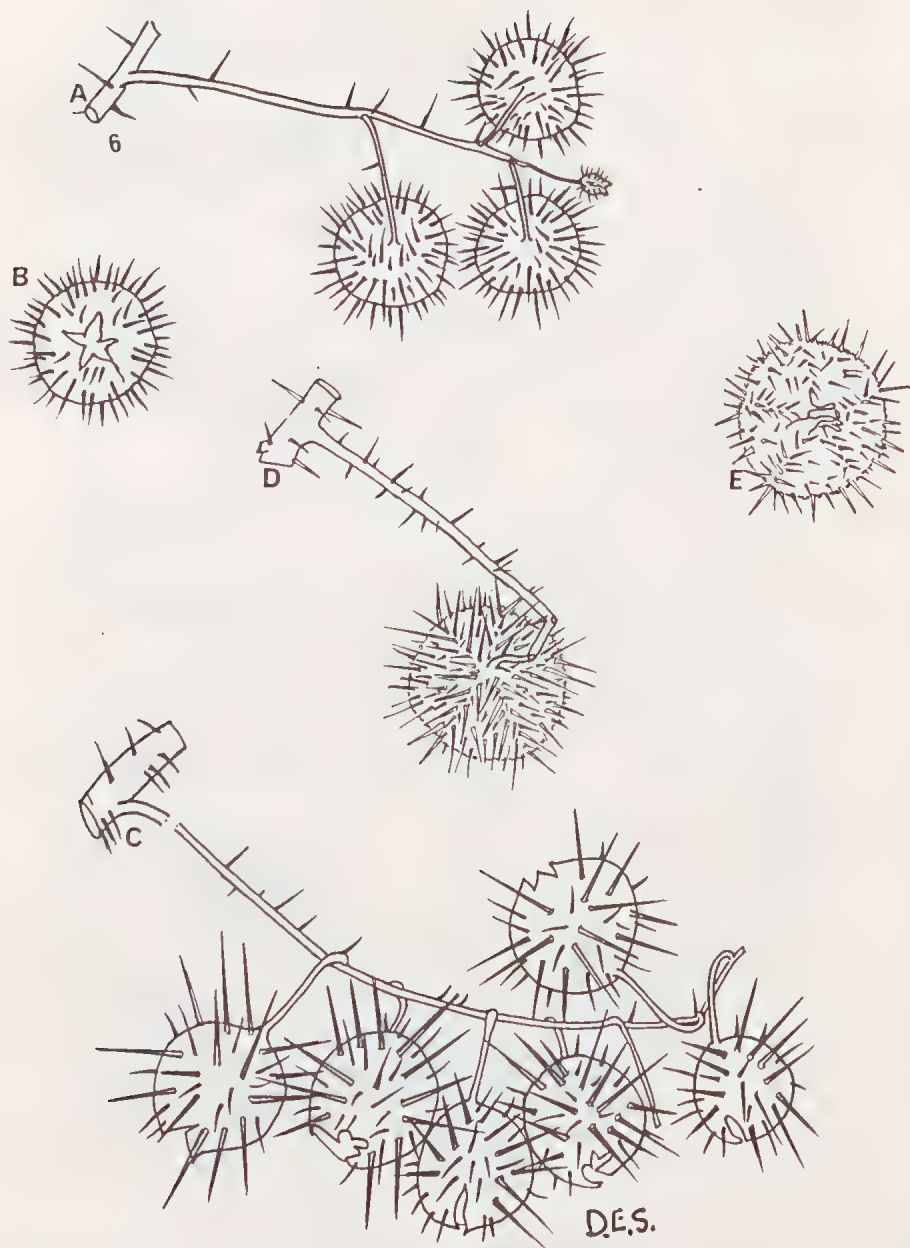


Fig. 153. *Solanum* fruits. A, *S. echinatum* (Symon 7185, ADW); B, *S. echinatum* (Symon 7185, ADW); C, *S. lucani* (Symon 5311, ADW); D, *S. seitheae* (Symon 4959, ADW); E, *S. seitheae* (Symon 4959, ADW).



Fig. 154. *Solanum* fruits. A, *S. eardleyae* (Latz 5044, ADW); B, *S. quadriloculatum* (Symon 5282, ADW); C, *S. petrophilum* (Burford s.n., ADW 32646); D, *S. petrophilum* (Smith-White s.n., ADW 33388); E, *S. sturtianum* (Symon 6738, ADW); F, *S. oligacanthum* (Beaglehole 28137, ADW); G, *S. karsensis* (Gloster s.n., ADW 22208); H, *S. lasiophyllum* (Symon 9928, ADW); I, *S. gilesii* (Latz 4035, ADW); J, *S. gabrielae* (Symon s.n., ADW 40493); K, *S. ashbyae* (Symon 10,005, ADW); L, *S. lachnophyllum* (Gardner 7871, PERTH).

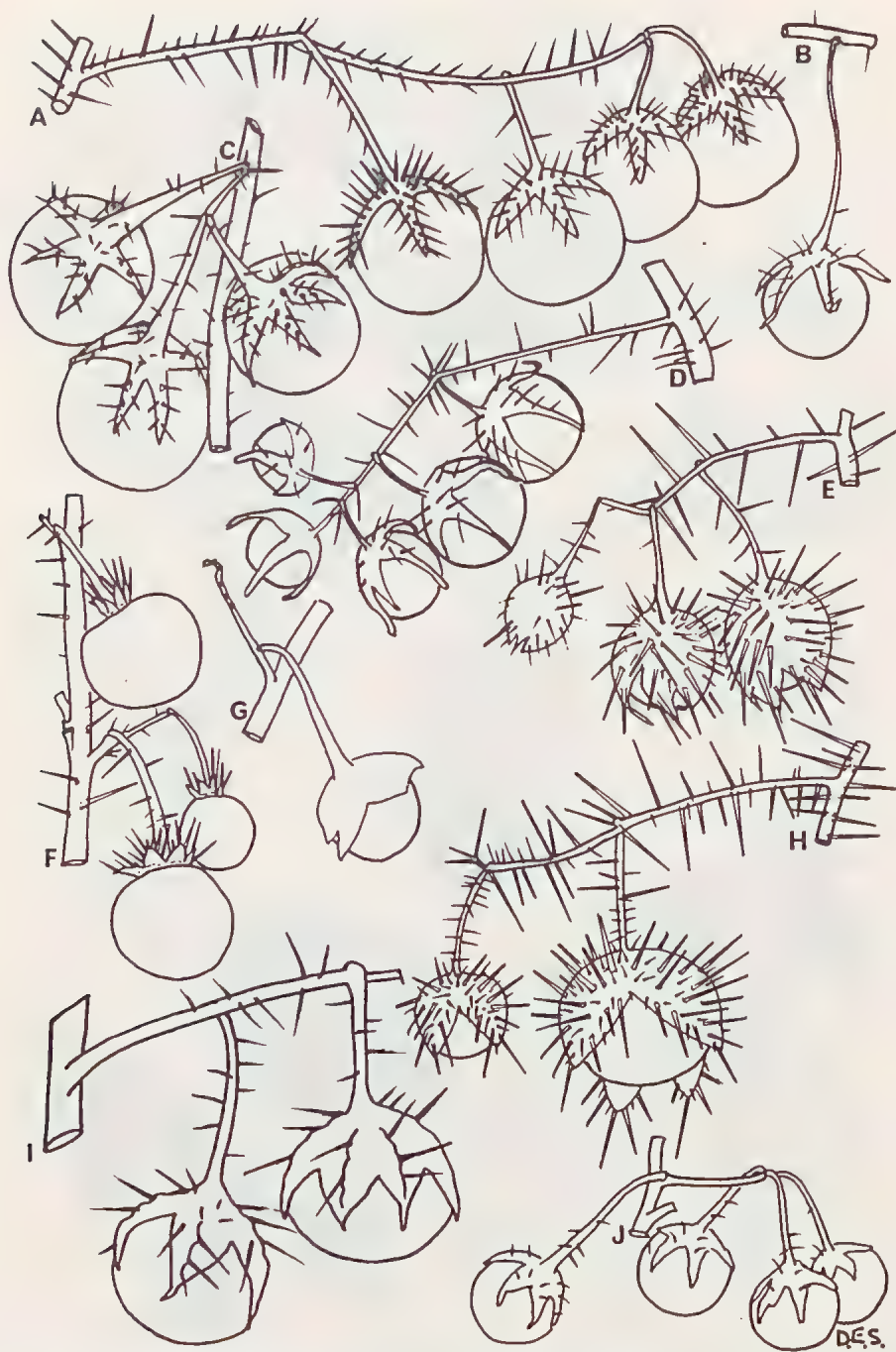


Fig. 155. *Solanum* fruits. A, *S. multiglochidiatum* (Symon 4873, ADW); B, *S. pungetium* (Beauglehole 32919, ADW); C, *S. prinophyllum* (Symon s.n., ADW 42432); D, *S. cookii* (Webb & Tracey 8355, ADW); E, *S. hystrix* (Symon 4482, ADW); F, *S. cinereum* (Symon 9850, ADW); G, *S. brownii* (Maiden s.n., ADW 32243); H, *S. hoplopetalum* (Symon 5476, ADW); I, *S. campanulatum* (Symon s.n., ADW 31608); J, *S. elaeagnifolium* (Hawker s.n., ADW 5478).

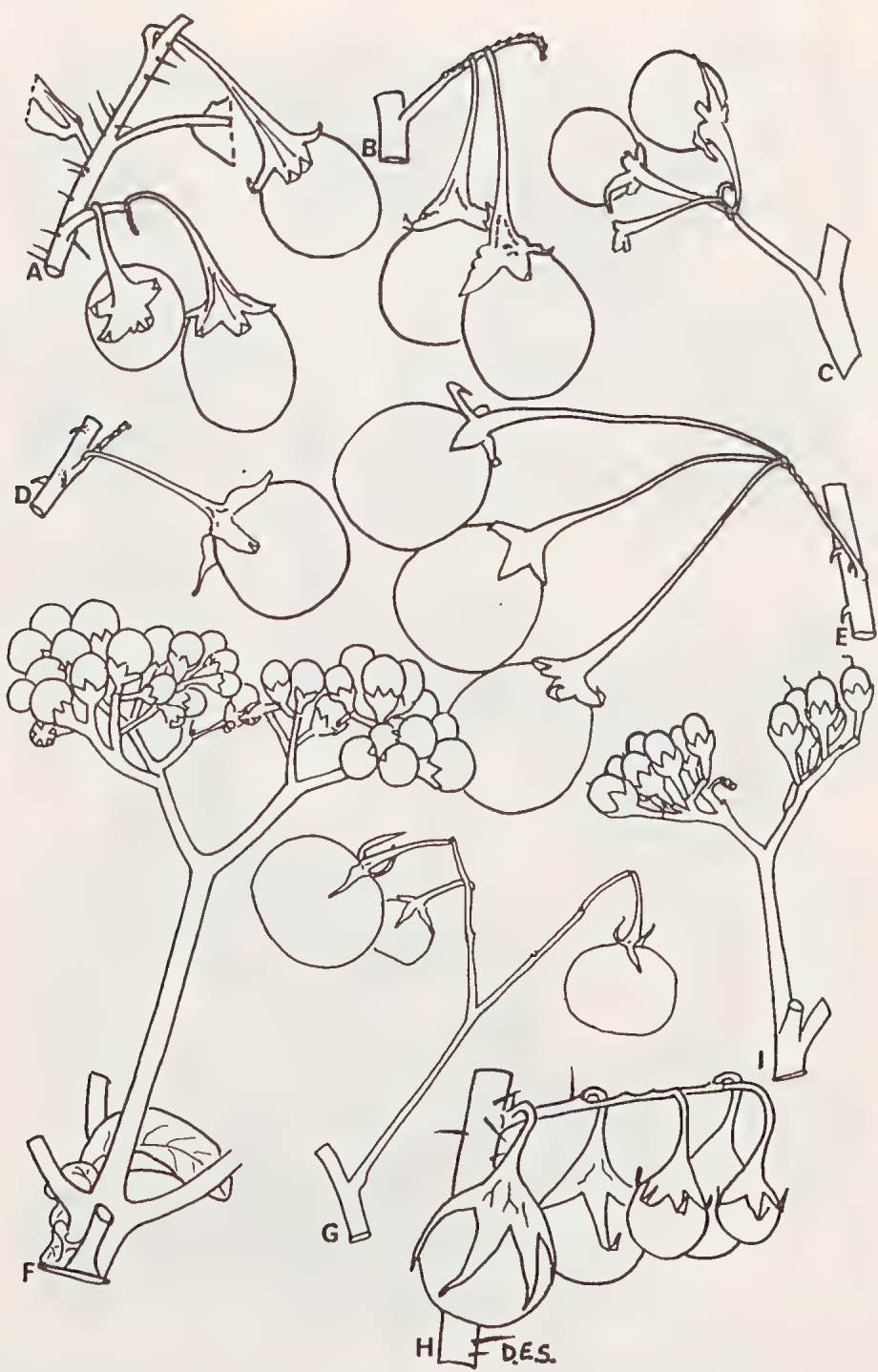


Fig. 156. *Solanum* fruits. A, *S. macoorai* (Symon s.n., ADW 37172); B, *S. dallachii* (Symon s.n., ADW 42139); C, *S. inaequilaterum* (Tracey s.n., ADW 35912); D, *S. hamulosum* (Hyland 7866, ADW); E, *S. dimorphispinum* (Webb & Tracey 8352, ADW); F, *S. mauritianum* (Browning s.n., ADW 44216) $\times \frac{1}{2}$; G, *S. dimidiatum* (Draper s.n., ADW 40485); H, *S. furfuraceum* (Symon s.n., ADW 42138); I, *S. erianthum* (Symon s.n., ADW 42702) $\times \frac{1}{2}$.

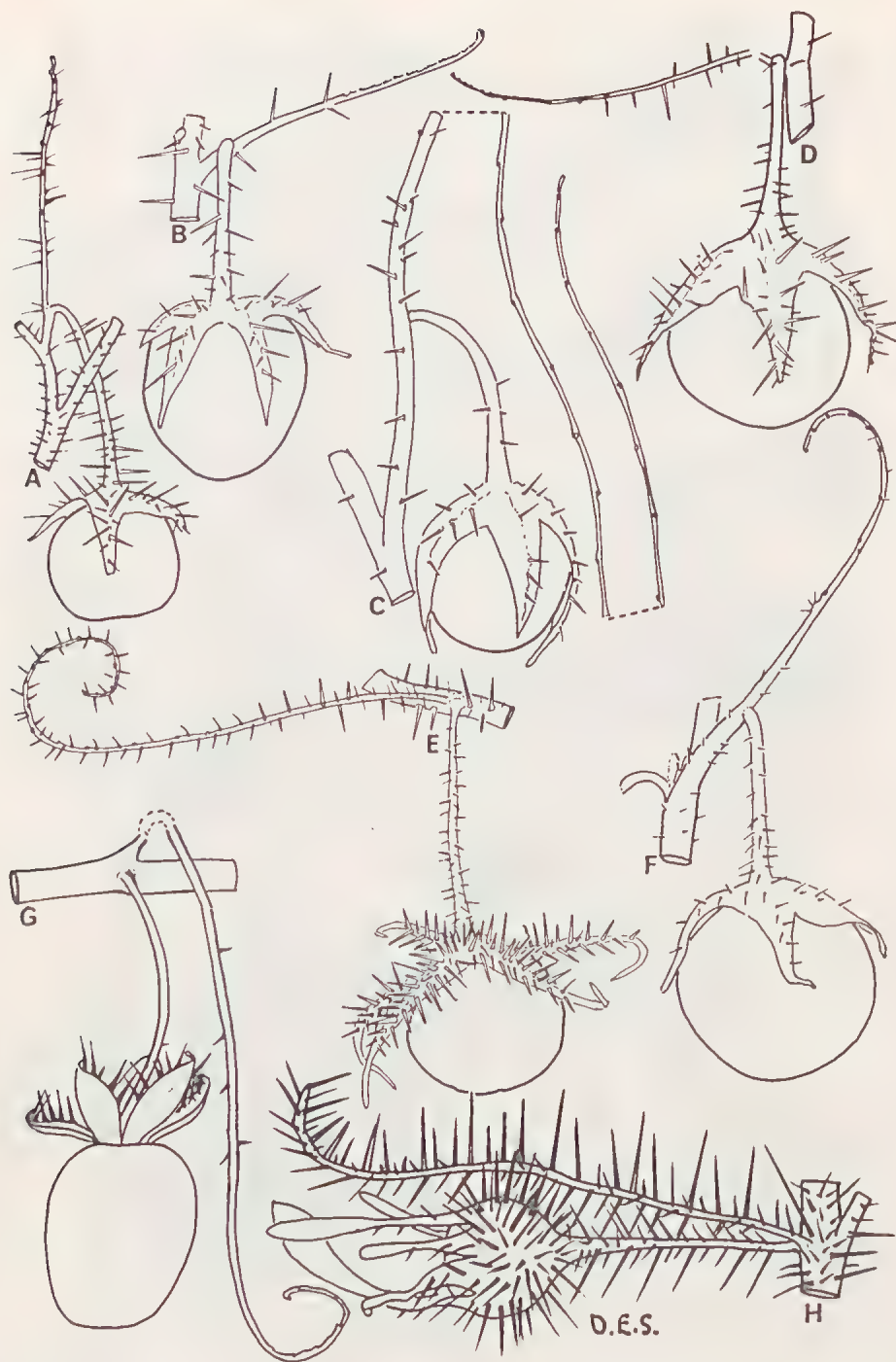


Fig. 157. *Solanum* fruits. A, *S. eburneum* (Symon 6954, ADW); B, *S. chippendalei* (Symon 10365, ADW); C, *S. phlomoides* (Symon 10092, ADW); D, *S. diversiflorum* (Symon 5432, ADW); E, *S. clarkiae* (Symon 7991, ADW); F, *S. beagleholei* (Beaglehole 47550, ADW); G, *S. melanospermum* (Symon 5064, ADW); H, *S. heteropodium* (Wilson 10895, PERTH).

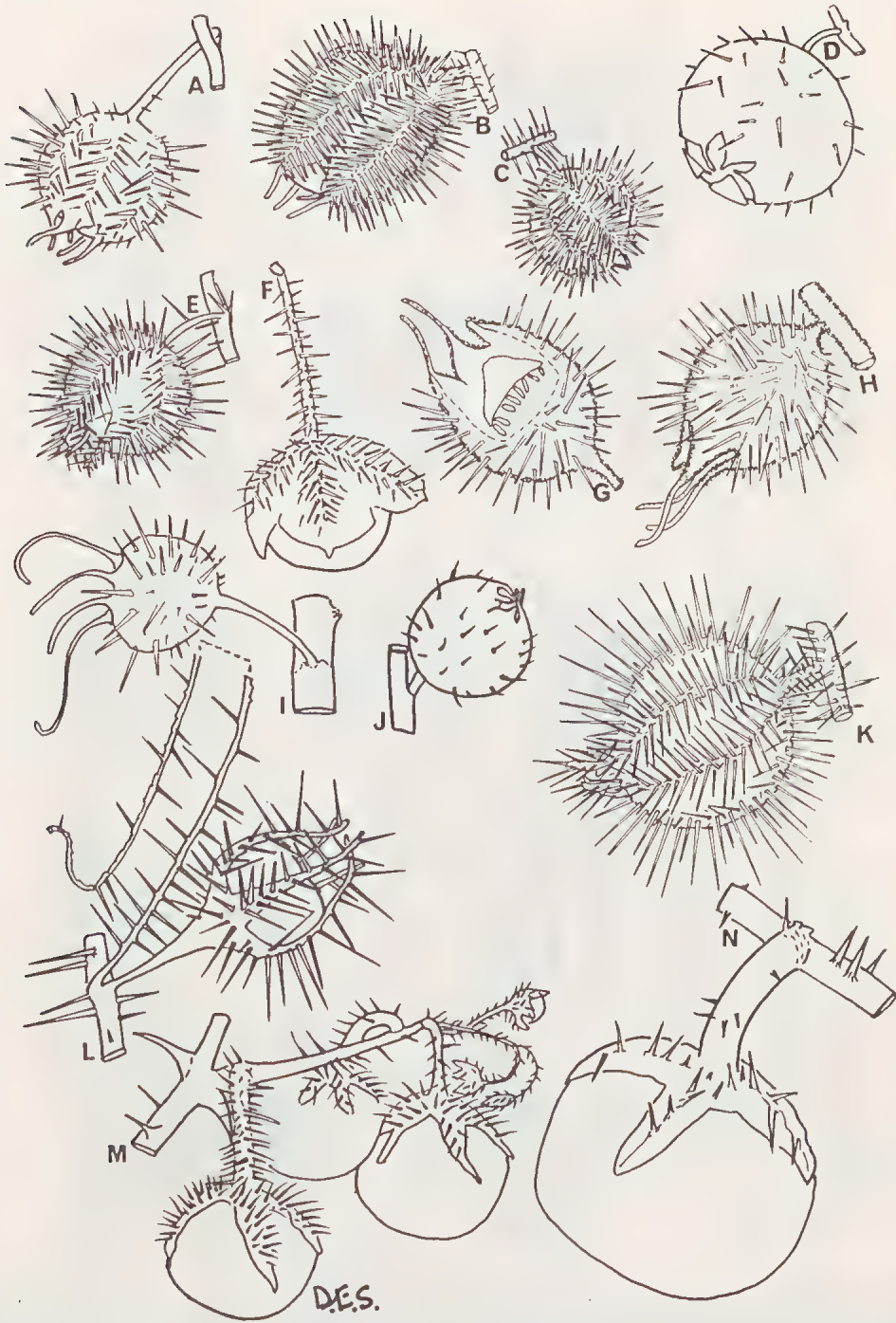


Fig. 158. *Solanum* fruits. A, *S. cunninghamii* (Symon 6999, ADW); B, *S. dioicum* (Symon 5342, ADW); C, *S. petraeum* (Symon 7139, ADW); D, *S. asymmetriphyllum* (Symon 10345, ADW); E, *S. leopoldensis* (Symon 7028, ADW); F, *S. cataphractum* (Cunningham s.n., K); G, *S. vansittartensis* (Kenneally 4793, PERTH), cut open to show cap; H, *S. vansittartensis* (Kenneally 4793, PERTH); I, *S. tudununggae* (Symon 10201, ADW); J, *S. tudununggae* (Symon 10201, ADW); K, *S. carduiforme* (Farrell 922, ADW); L, *S. oedipus* (Symon 7119, ADW); M, *S. hermanni* (Symon 3181, ADW); N, *S. marginatum* (Symon s.n., ADW 36691).

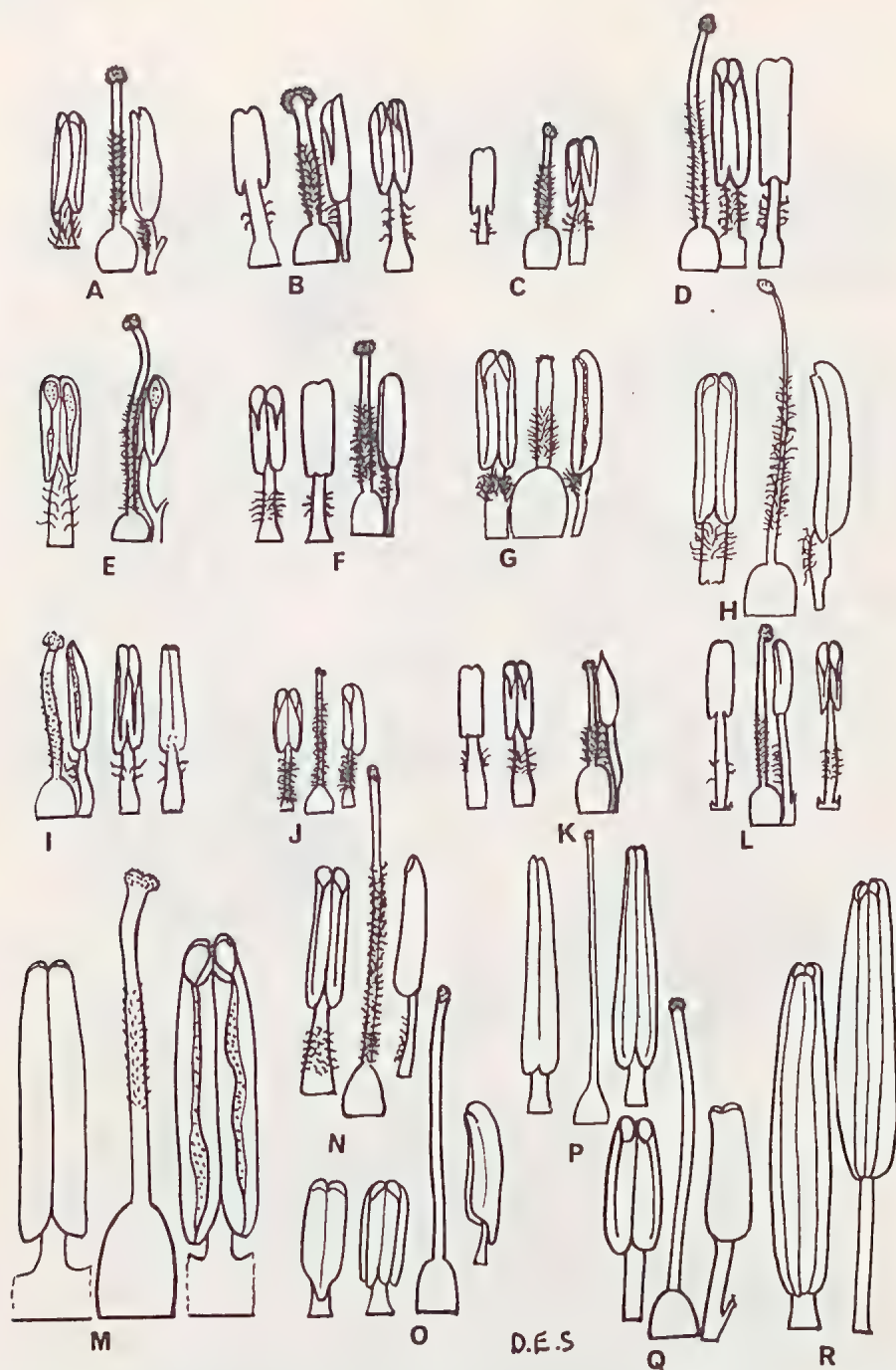


Fig. 159. *Solanum* stamens and pistils. A, *S. nigrum* (Feuerheerdt, ADW 12114); B, *S. opacum* (Beauglehole 33110, ADW); C, *S. americanum* (Symon s.n., ADW 35921); D, *S. chenopodioides* (Symon s.n., ADW 35876); E, *S. furcatum* (Symon s.n., ADW 43730); F, *S. villosum* (Symon s.n., ADW 35909); G, *S. scabrum* (Symon s.n., ADW 35880); H, *S. douglasii* (Willis s.n., ADW 43563); I, *S. triflorum* (Symon s.n., ADW 36039); J, *S. palitans* (Symon 6715, ADW); K, *S. retroflexum* (Symon s.n., ADW 41010); L, *S. sarrachoides* (Paton s.n., ADW 44794); M, *S. tuberosum* (Symon s.n., ADW 46238); N, *S. jasminoides* (Symon s.n., ADW 42140); O, *S. callium* (Symon s.n., ADW 43685); P, *S. dulcamara* (Symon s.n., ADW 28082); Q, *S. seaforthianum* (Symon 4719, ADW); R, *S. wendlandii* (Symon s.n., ADW 42151).

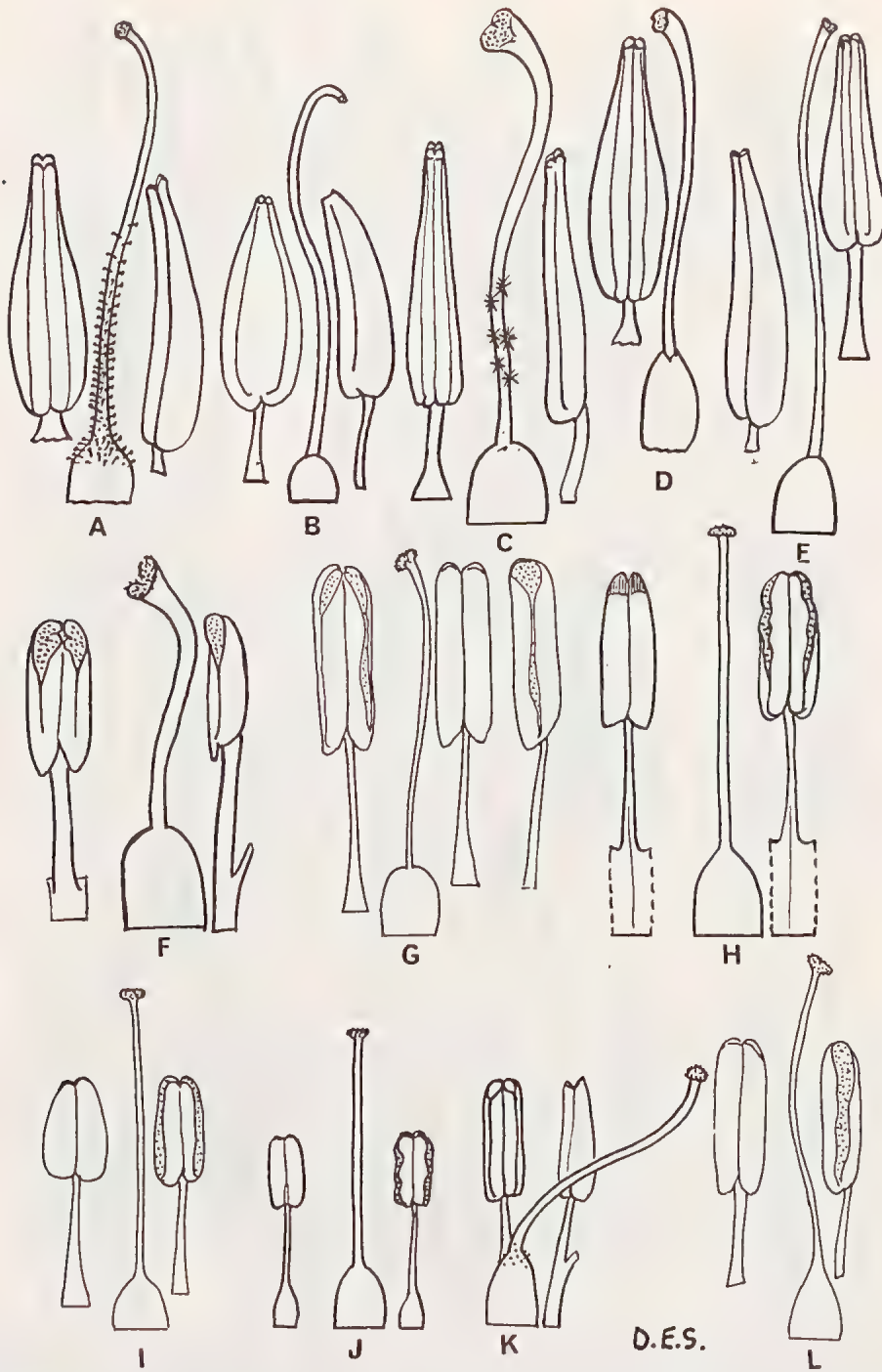


Fig. 160. *Solanum* stamens and pistils. A, *S. lachnophyllum* (Symon 9971, ADW); B, *S. lasiophyllum* (Symon 4705, ADW); C, *S. gilesii* (George 9014, ADW); D, *S. ashbyae* (Symon 9983, ADW); E, *S. gabrielae* (Symon s.n., ADW 40493); F, *S. aviculare* (Symon s.n., ADW 40816); G, *S. laciniatum* (Symon 7632, ADW); H, *S. symonii* (Symon s.n., ADW 405 86); I, *S. vescum* (Symon s.n., ADW 40411); J, *S. simile* (Beaglehole 29765, ADW); K, *S. capsiciforme* (Symon 8320, ADW); L, *S. linearifolium* (Symon s.n., ADW 48382).

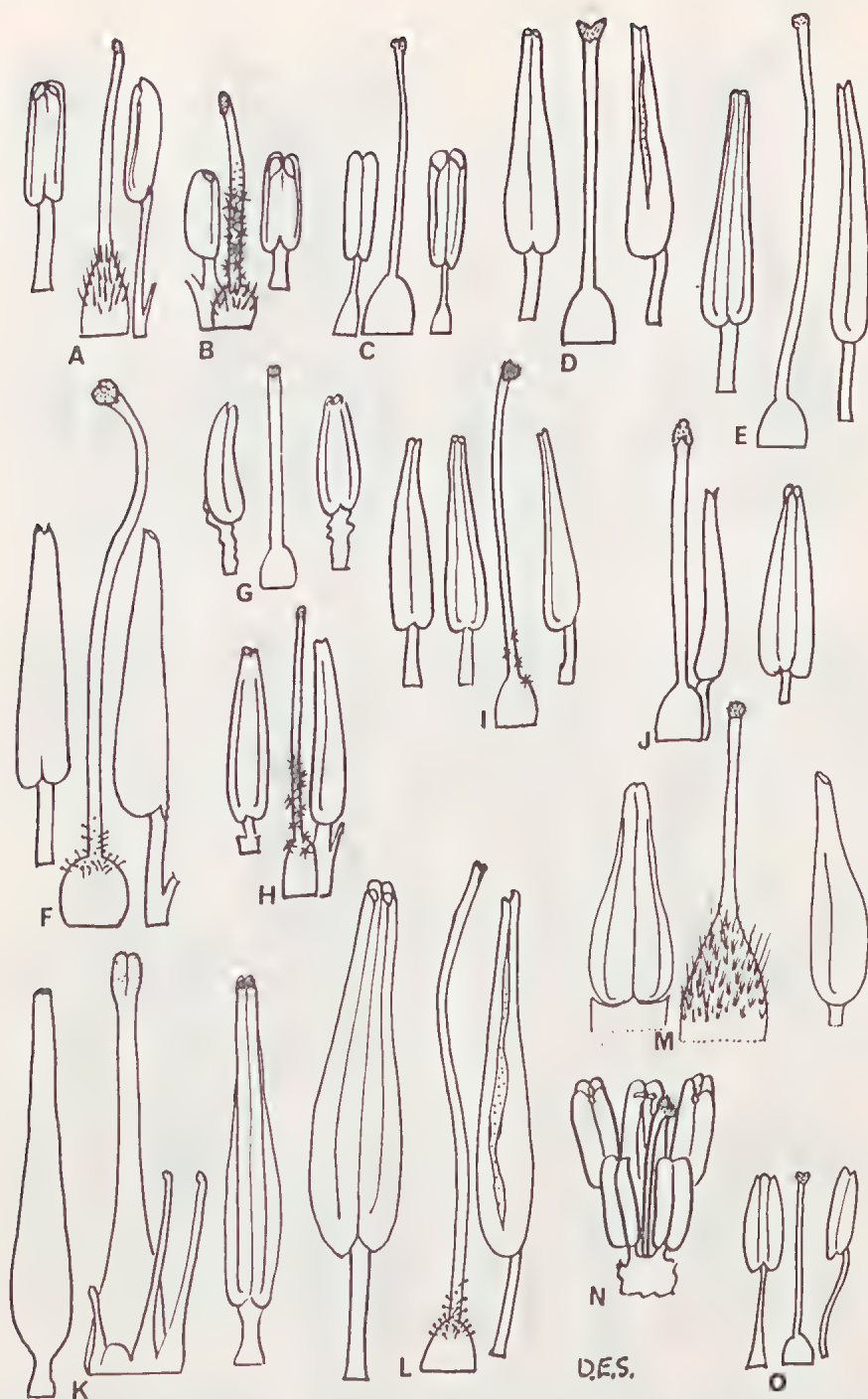


Fig. 161. *Solanum* stamens and pistils. A, *S. erianthum* (Symon s.n., ADW 42702); B, *S. mauritianum* (Symon 4724, ADW); C, *S. pseudocapsicum* (Symon s.n., ADW 43660); D, *S. capsicoides* (Symon s.n., ADW 38339); E, *S. torvum* (Symon 4755, ADW); F, *S. hispidum* (Symon s.n., ADW 31466); G, *S. giganteum* (Symon s.n., ADW 36679); H, *S. tetrandrum* (Symon 7913, ADW); I, *S. dunalianum* (Symon s.n., ADW 48411); J, *S. viride* (Symon s.n., ADW 43663); K, *S. mammosum* (Symon s.n., ADW 38377); L, *S. sisymbriifolium* (Symon 3950, ADW); M, *S. ferox* (Moriarty 1645, ADW); N, *S. rantonnei* (Symon s.n., ADW 45436); O, *S. pugiunculiferum* (Symon s.n., ADW 42145).

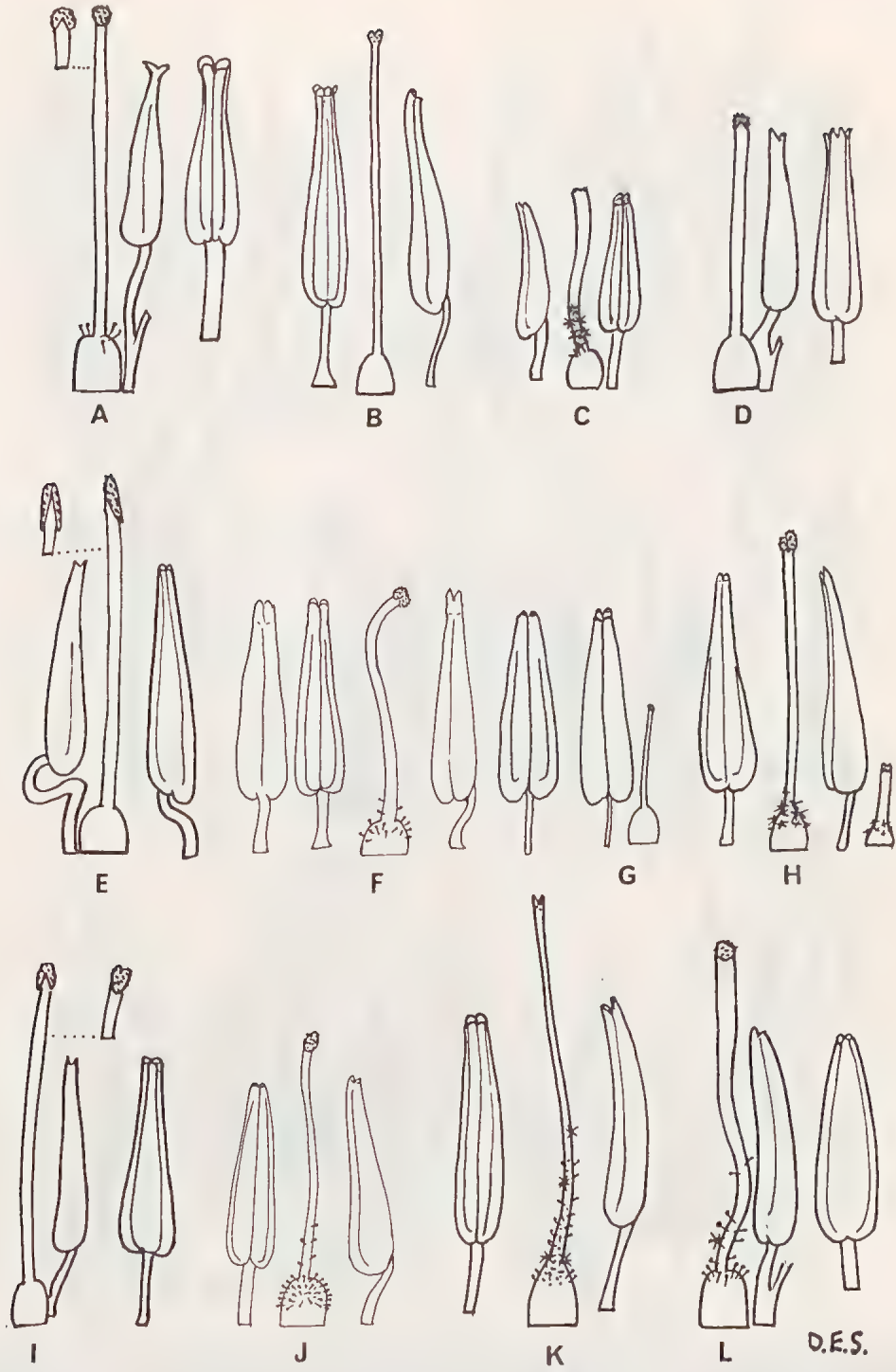


Fig. 162. *Solanum* stamens and pistils. A, *S. semiarmatum* (Symon s.n., ADW 43731); B, *S. stelligerum* (Symon 4702, ADW); C, *S. parvifolium* (Everist 7153, ADW); D, *S. ferocissimum* (Symon s.n., ADW 42310); E, *S. corifolium* (Webb & Tracey 10739, ADW); F & G, *S. yirrakalensis* (Symon s.n., ADW 48653); H, *S. discolor* (Symon s.n., ADW 48381); I, *S. densevestitum* (Symon s.n., ADW 42134); J, *S. nemophilum* (Moriarty 1666, ADW); K, *S. elegans* (Moriarty 544, ADW); L, *S. chenopodium* (Symon s.n., ADW 35842).

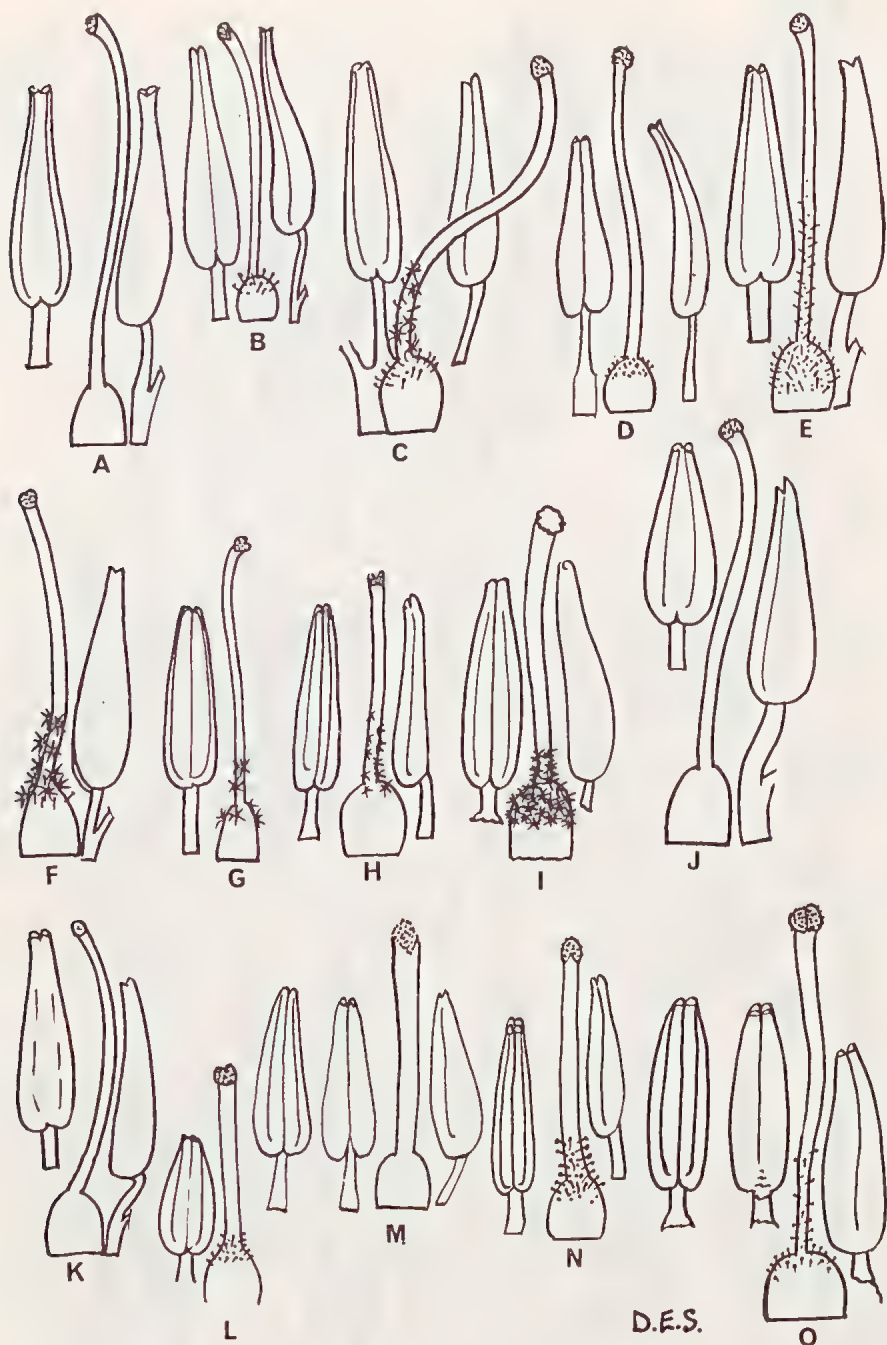


Fig. 163 *Solanum* stamens and pistils. A, *S. orbiculatum* (Symon s.n., ADW 43251); B, *S. nummularium* (Symon 5478, ADW); C, *S. oldfieldii* (Symon s.n., ADW 43678); D, *S. plicatile* (Symon 5464, ADW); E, *S. coactiliferum* (Symon s.n., ADW 42132); F, *S. centrale* (Symon s.n., ADW 44389); G, *S. esuriale* —; H, *S. tumulicola* (Chippendale s.n., ADW 29140); I, *S. terraneum* (Symon 9975, ADW); J, *S. tetrathecum* (Symon s.n., ADW 42325); K, *S. elachophyllum* (Symon s.n., ADW 43683); L, *S. eremophilum* (Morris s.n., ADW 12706); M, *S. lacunarium* (Pearce 65, ADW); N, *S. papaverifolium* (Gidley s.n., ADW 38147); O, *S. adenophorum* (Symon s.n., ADW 46384).

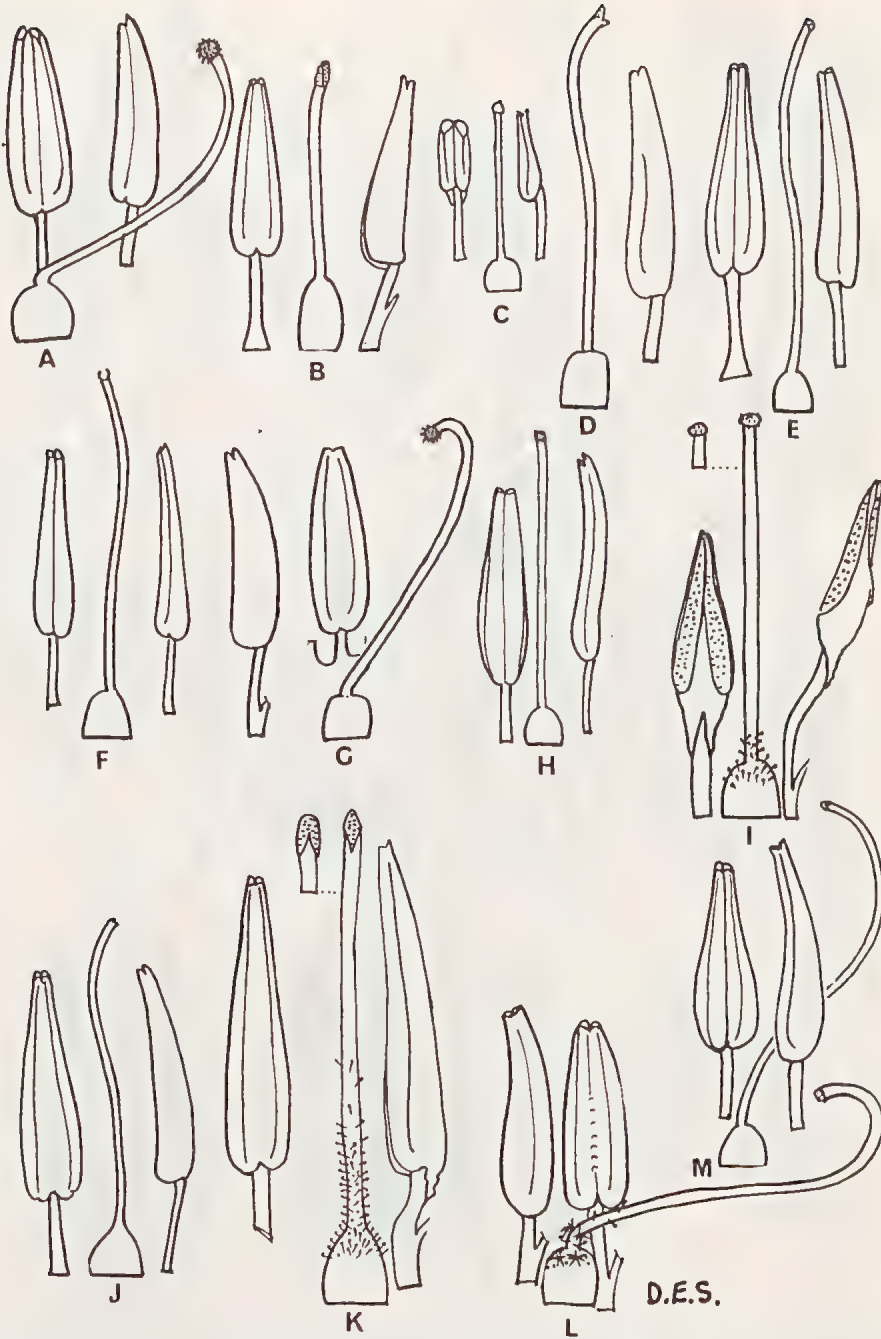


Fig. 164. *Solanum* stamens and pistils. A, *S. ellipticum* (Symon s.n., ADW 42136); B, *S. dianthophorum* (Moriarty 1466, ADW); C, *S. cleistogamum* (Symon s.n., ADW 38514); D, *S. horridum* (Symon s.n., ADW 40500); E, *S. seitheae* (Symon s.n., ADW 40491); F, *S. lucani* (Symon s.n., ADW 33015); G, *S. echinatum* (Symon 7185, ADW); H, *S. oligacanthum* (Symon 4720, ADW); I, *S. karsensis* (Pearce 63, ADW); J, *S. quadrilocalatum* (Symon s.n., ADW 42433); K, *S. sturtianum* (Symon s.n., ADW 40518); L, *S. petrophilum* (Symon s.n., ADW 40397); M, *S. eardleyae* (Latz 939, ADW).

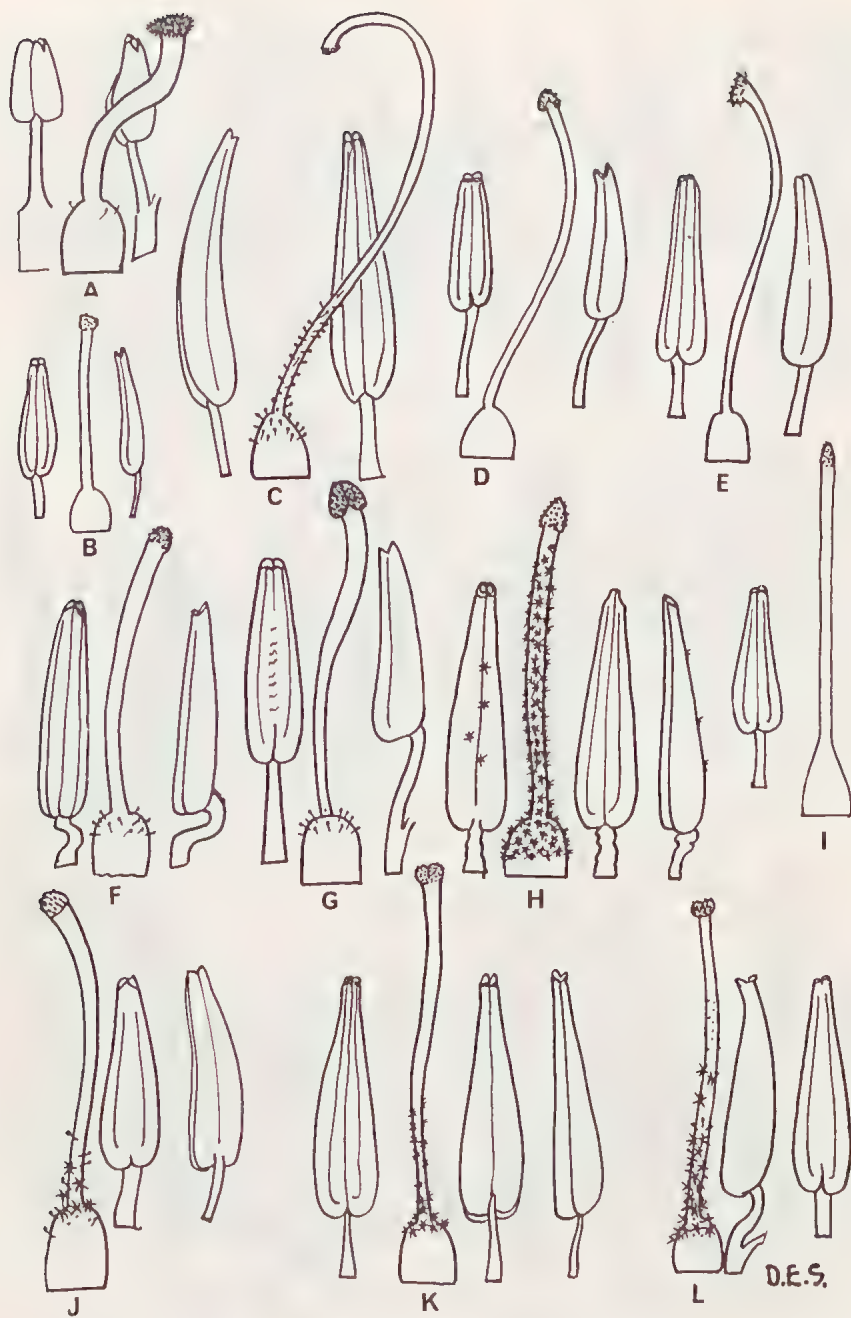


Fig. 165. *Solanum* stamens and pistils. A, *S. prinophyllum* (Symon 8529, ADW); B, *S. cookii* (Symon s.n., ADW 40380); C, *S. multiglochidiatum* (Symon s.n., ADW 40389); D, *S. pungetum* (Beaglehole 34521, ADW); E, *S. hystrix* (Symon s.n., ADW 40501); F, *S. inaequilaterum* (Symon s.n., ADW 45105); G, *S. macoorai* (Symon s.n., ADW 45106); H, *S. dallachii* (Symon s.n., ADW 48422); I, *S. hoplopetalum* (Howard s.n., ADW 35884); J, *S. furfuraceum* (Symon s.n., ADW 43682); K, *S. hamulosum* (Symon s.n., ADW 47936); L, *S. dimorphispinum* (Symon s.n., ADW 43089).

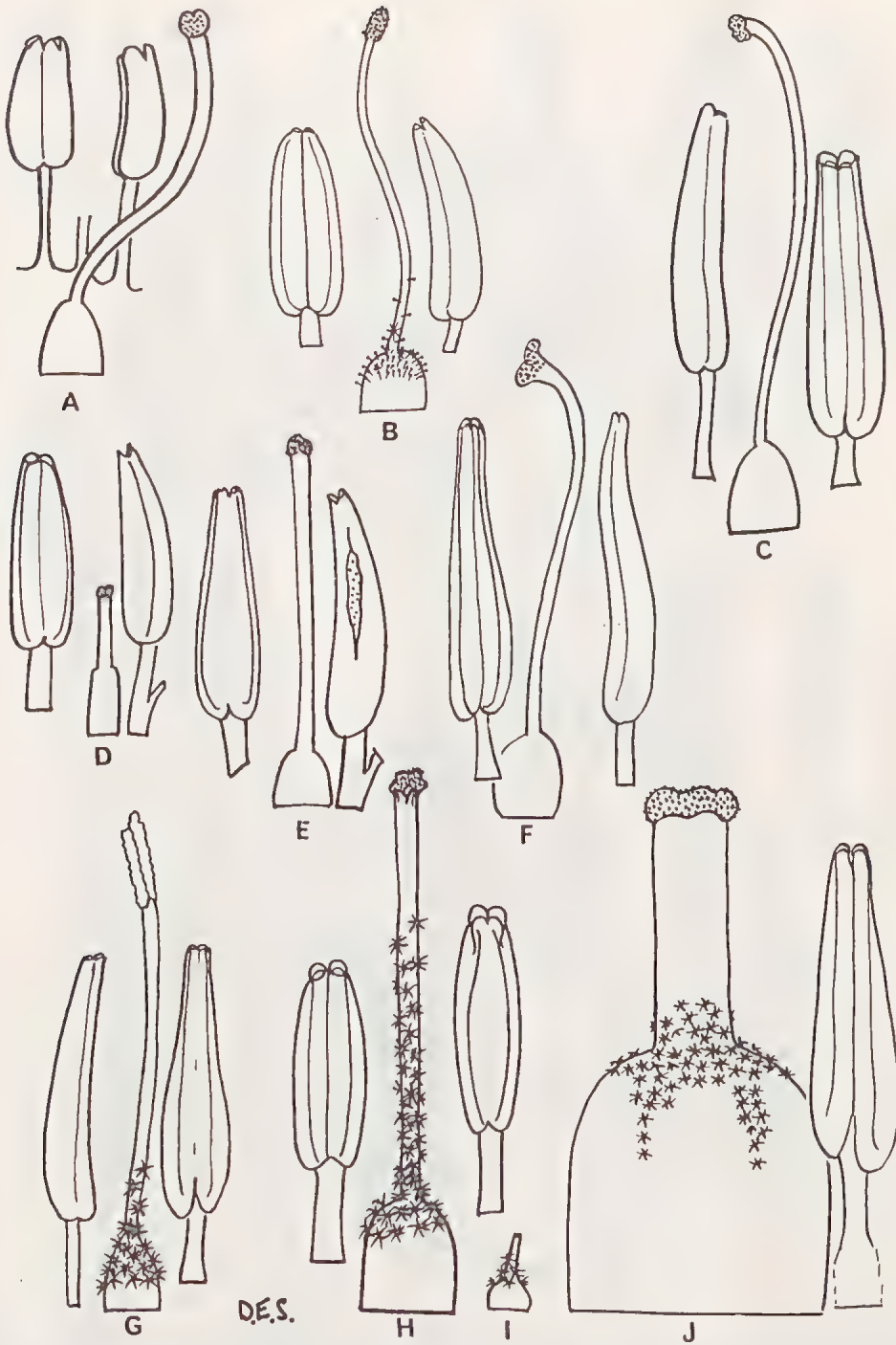


Fig. 166. *Solanum* stamens and pistils. A, *S. cinereum* (Symon s.n., ADW 38353); B, *S. brownii* (Maiden s.n., ADW 32243); C, *S. campanulatum* (Symon s.n., ADW 38344); D & E, *S. hermanni* (Symon s.n., ADW 43666); F, *S. elaeagnifolium* (Tideman s.n., ADW 26451); G, *S. dimidiatum* (Symon s.n., ADW 46241); H & I, *S. marginatum* (Symon s.n., ADW 38378); J, *S. melongena* (Symon s.n., ADW 44571).

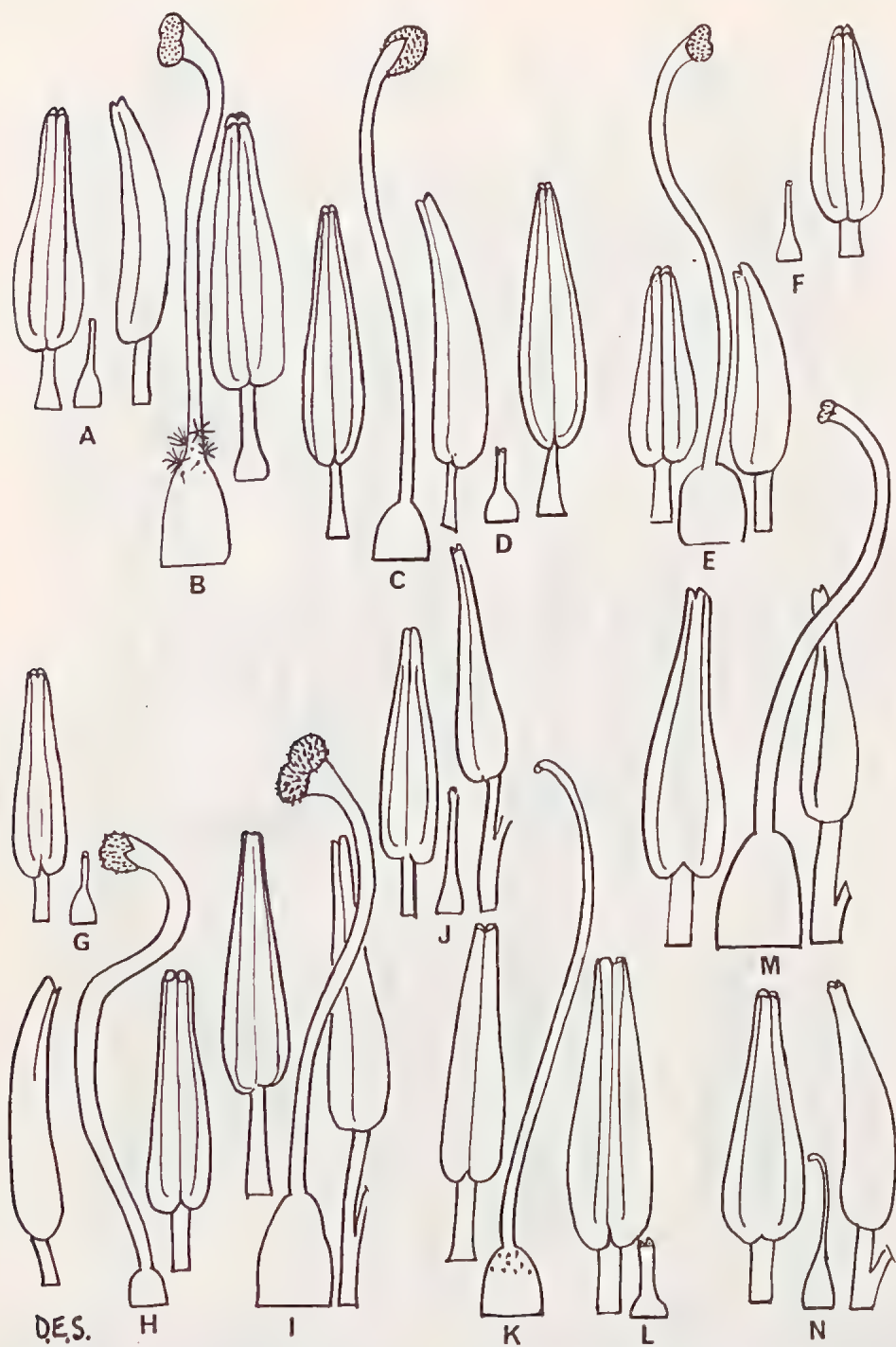


Fig. 167. *Solanum* stamens and pistils. A & B, *S. beaugleholei* (Symon 7164, ADW); C & D, *S. phlomoides* (Symon s.n., ADW 42143); E & F, *S. eburneum* (Symon 6953, ADW); G & H, *S. diversiflorum* (Symon s.n., ADW 42135); I & J, *S. chippendalei* (Symon 7192, ADW 42303); K & L, *S. clarkiae* (Symon s.n., ADW 42129); M & N, *S. melanospermum* (Symon 5064, ADW).

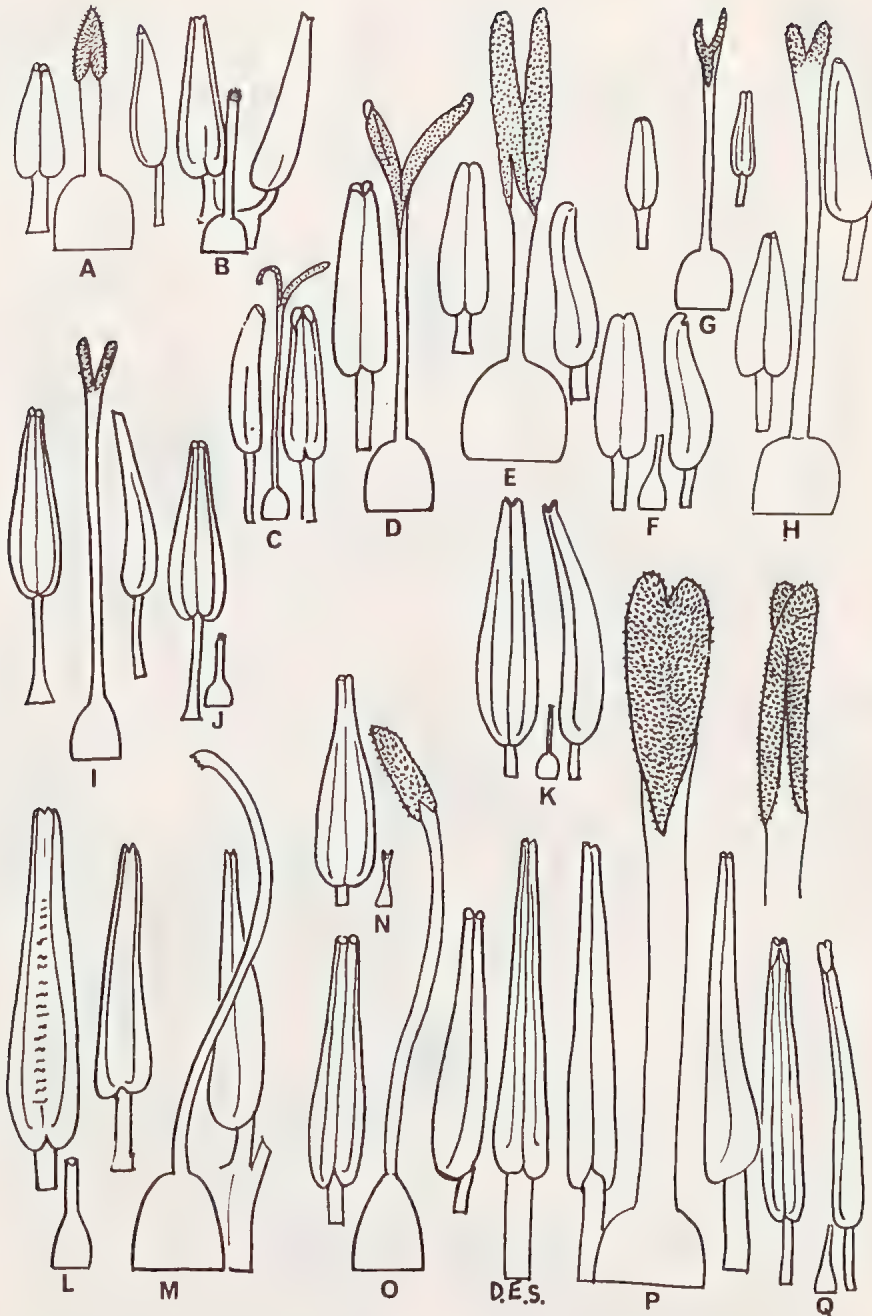
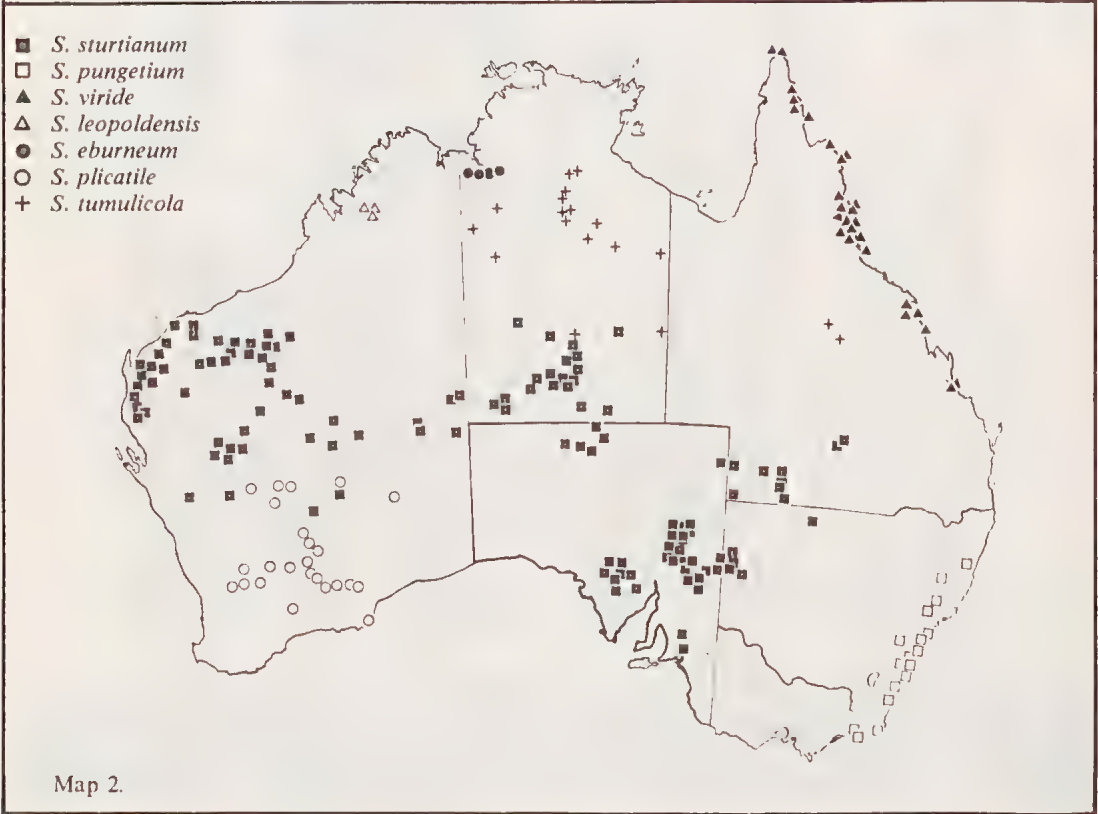
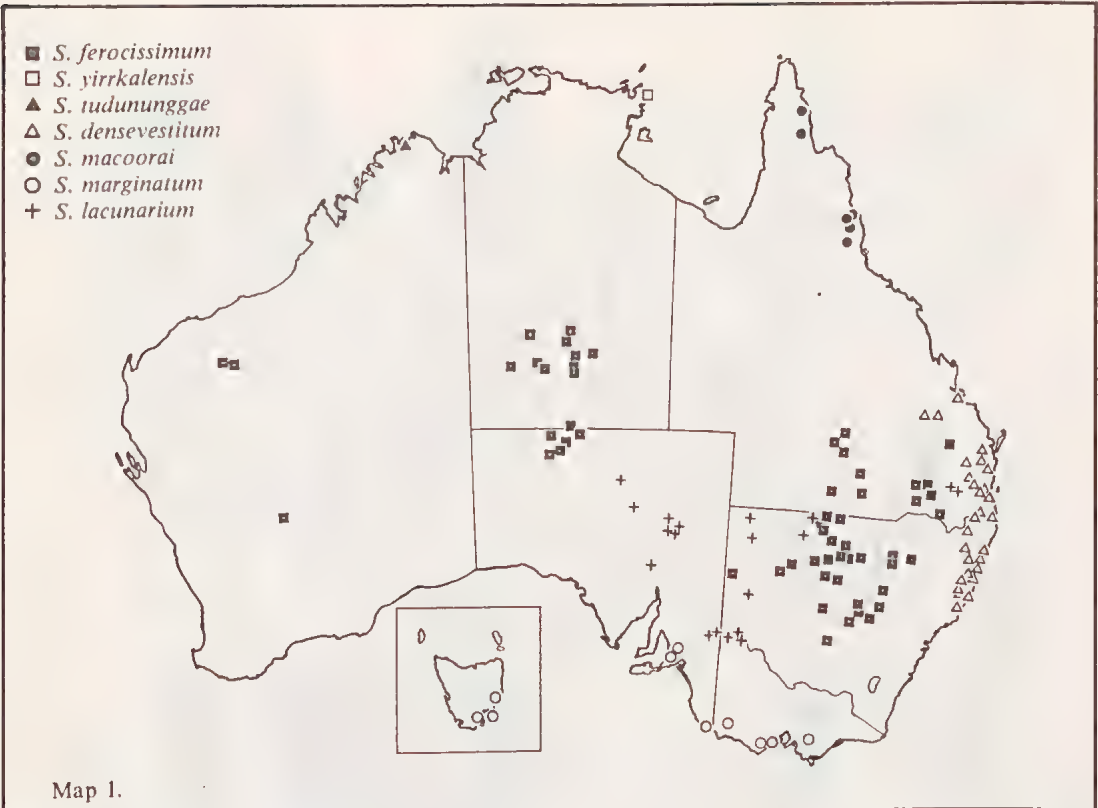
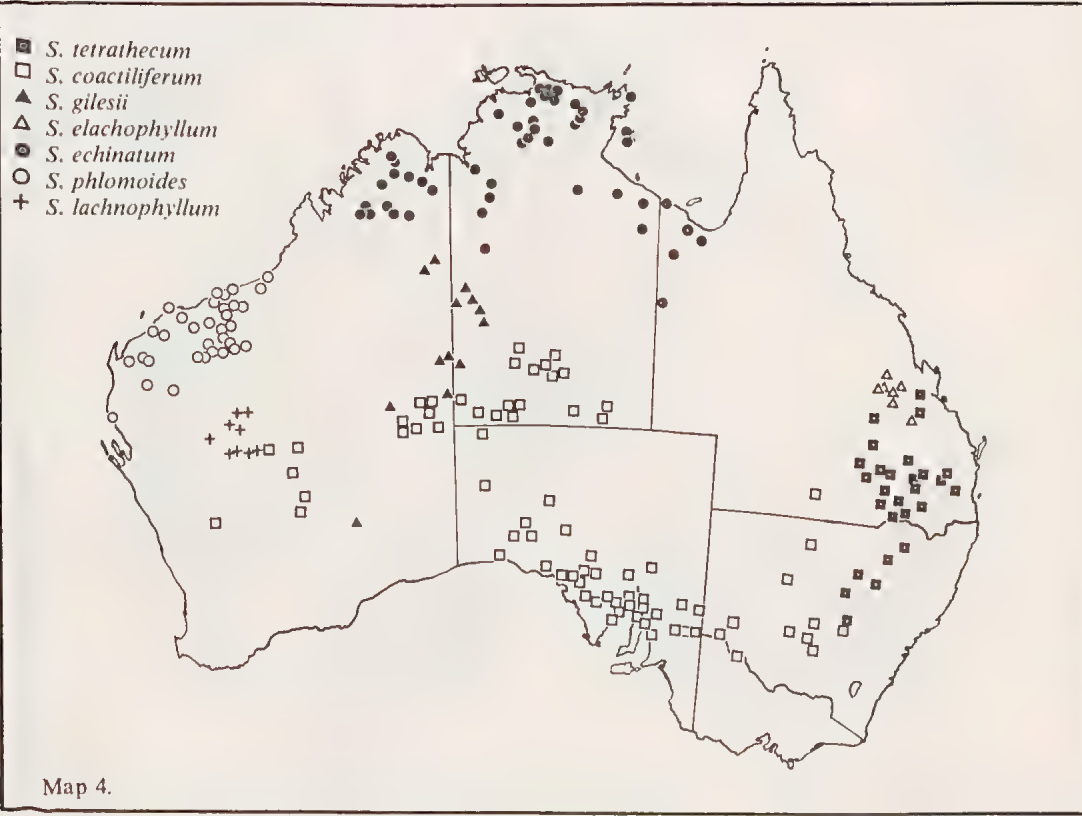
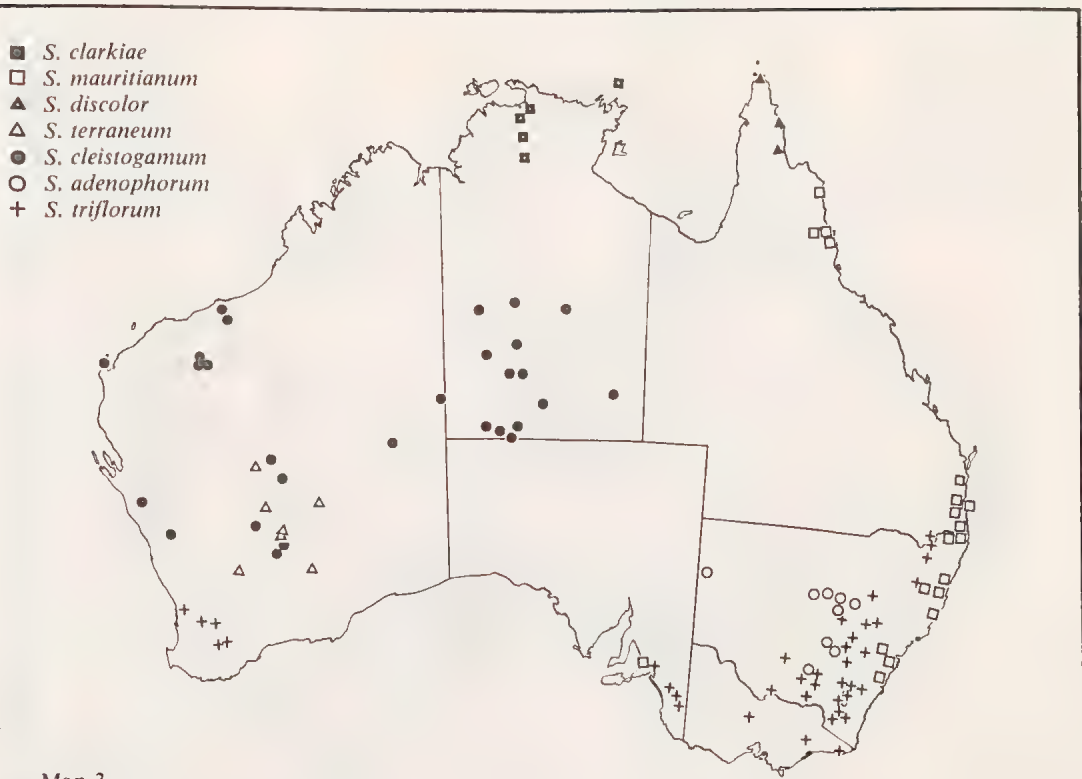
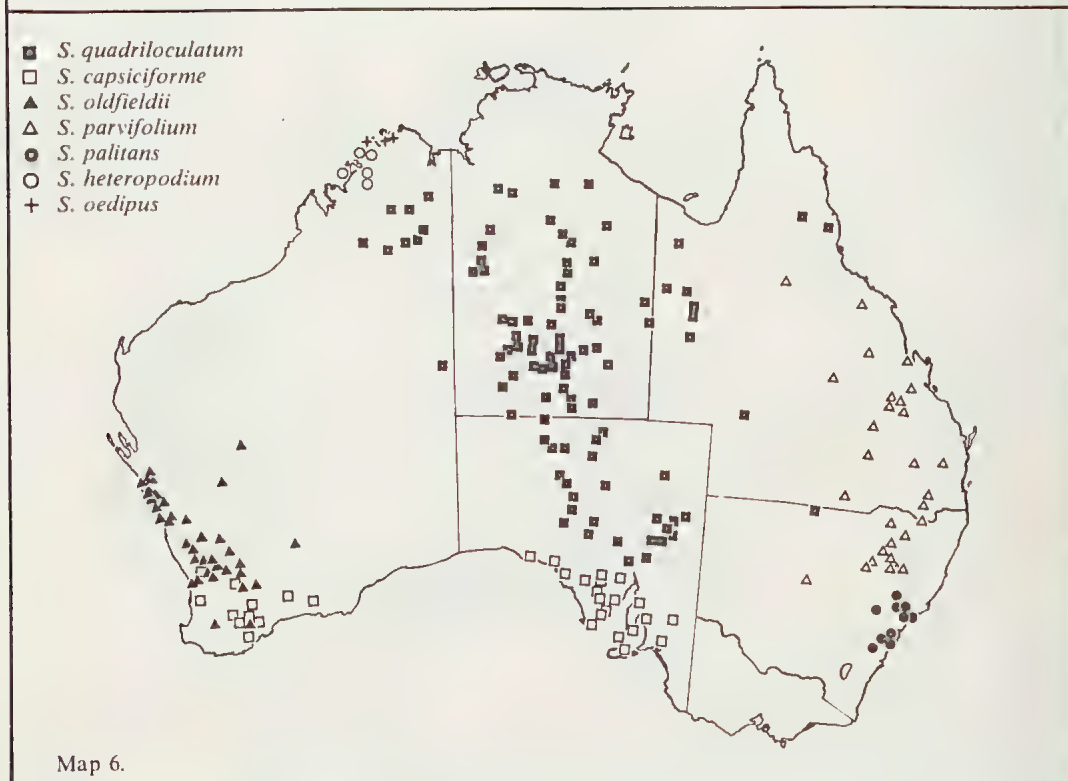
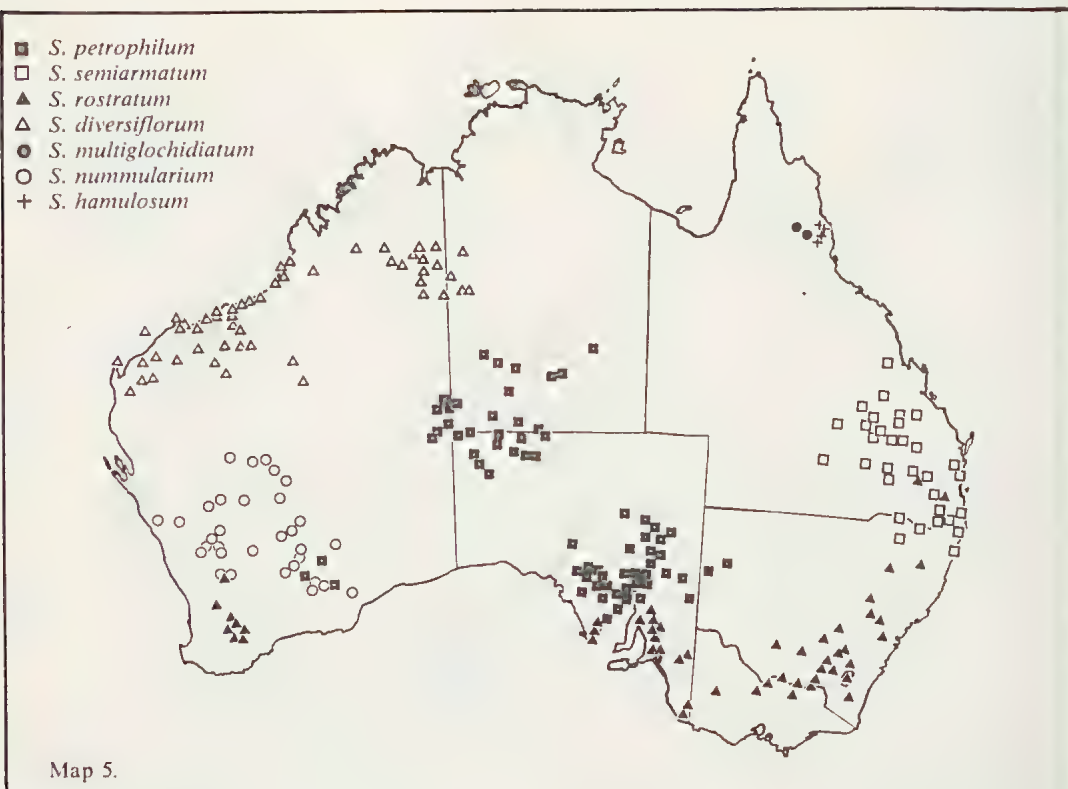
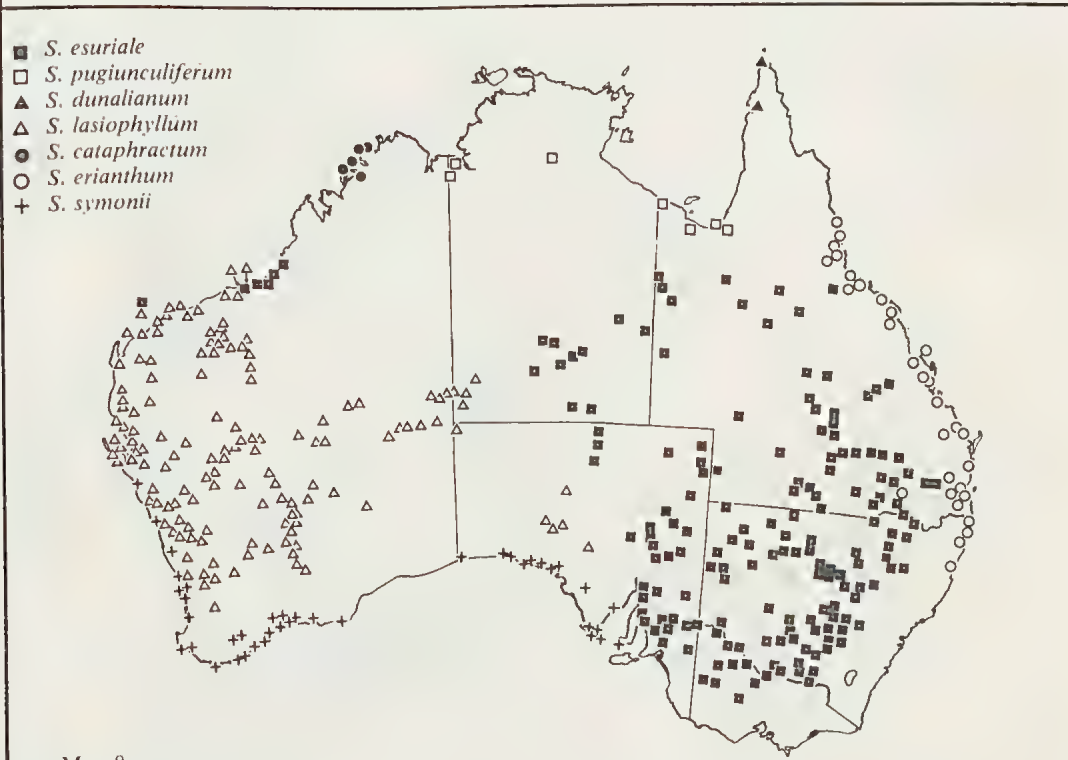
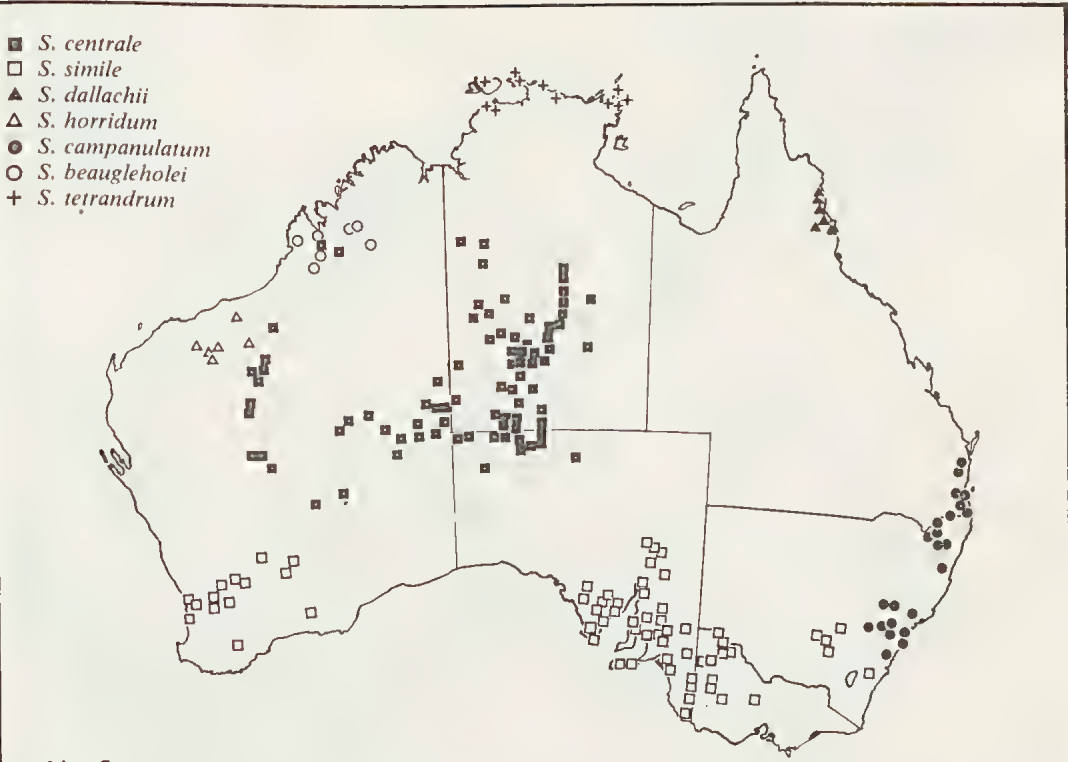


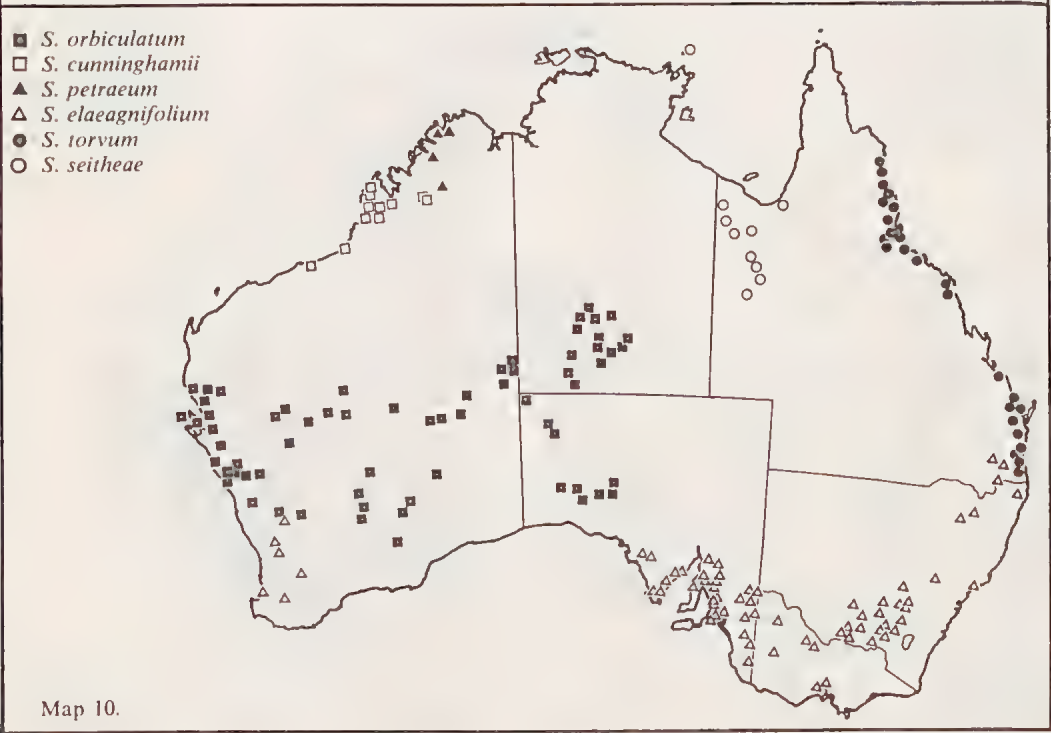
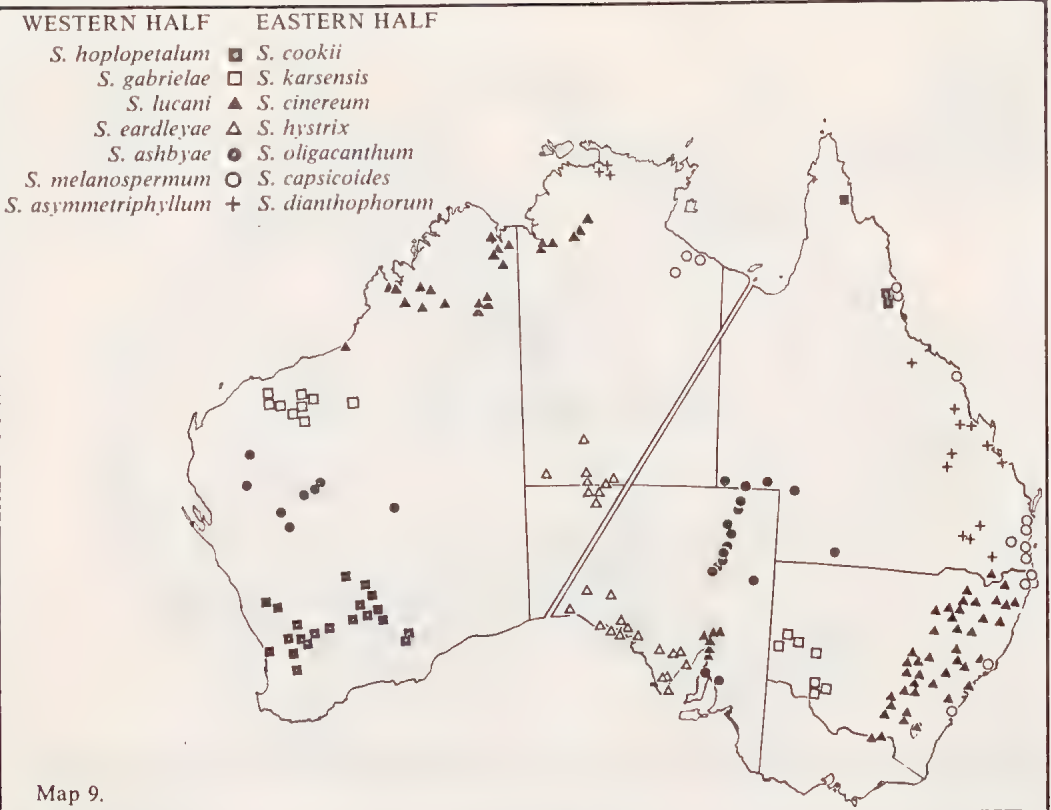
Fig. 168. *Solanum* stamens and pistils. A & B, *S. petraeum* (Symon 7139, ADW); C & D, *S. dioicum* (Symon 6938, ADW); E & F, *S. cunninghamii* (Symon 5340, ADW & 5342, ADW); G, *S. cataphractum* (Marchant 72/74, PERTH); H, *S. carduiforme* (Armit 728, MEL); I & J, *S. leopoldensis* (Symon s.n., ADW 40503); K, *S. heteropodium* (Wilson 10895, PERTH); L & M, *S. oedipus* (Symon s.n., ADW 44577); N & O, *S. asymmetriphyllum* (Symon s.n., ADW 38666 & ADW 38667); P & Q, *S. tudununggae* (Symon 10201, ADW & Broadbent 539, BM).

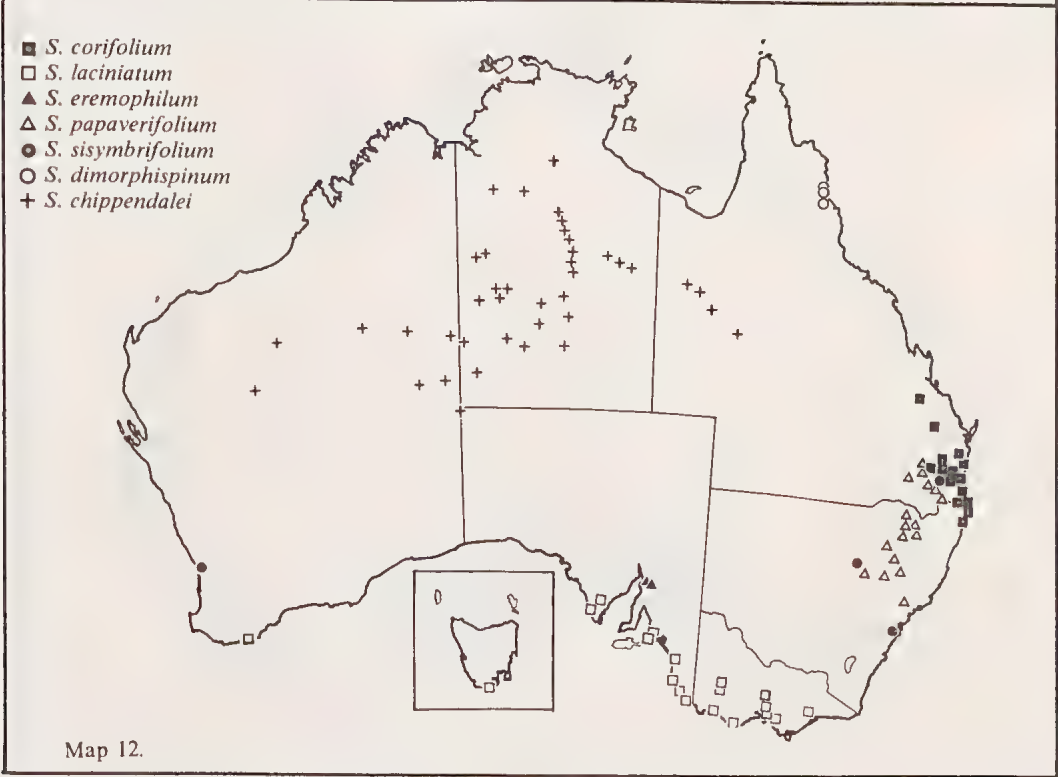
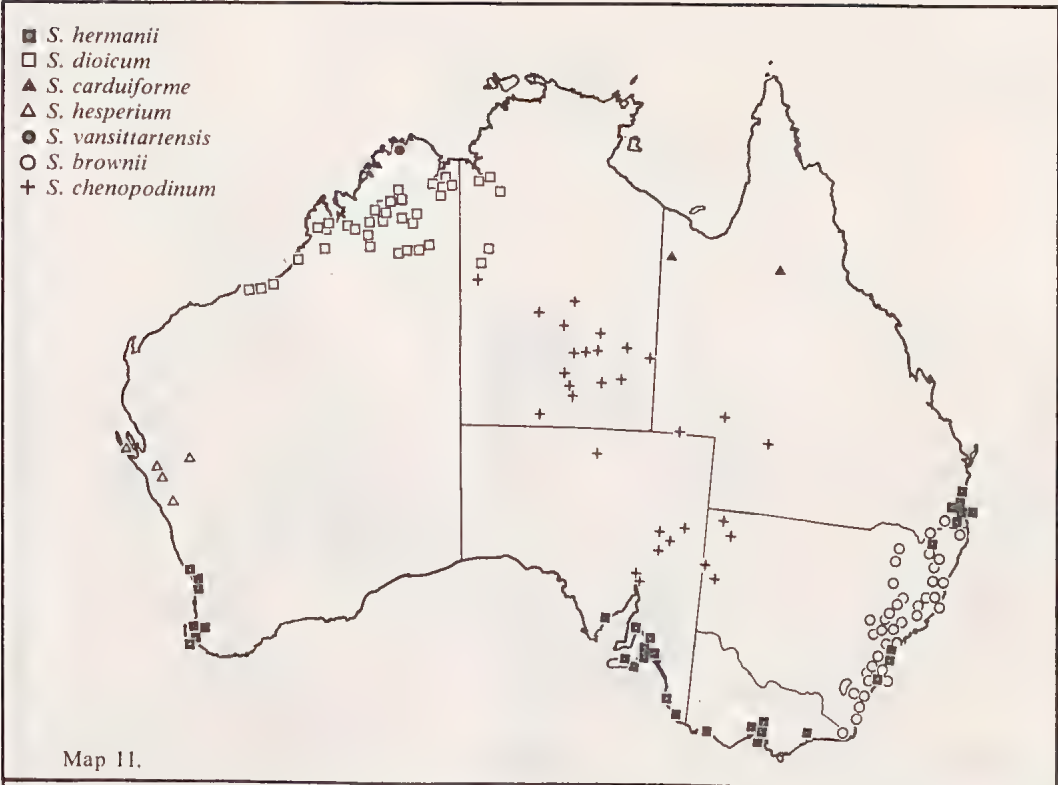




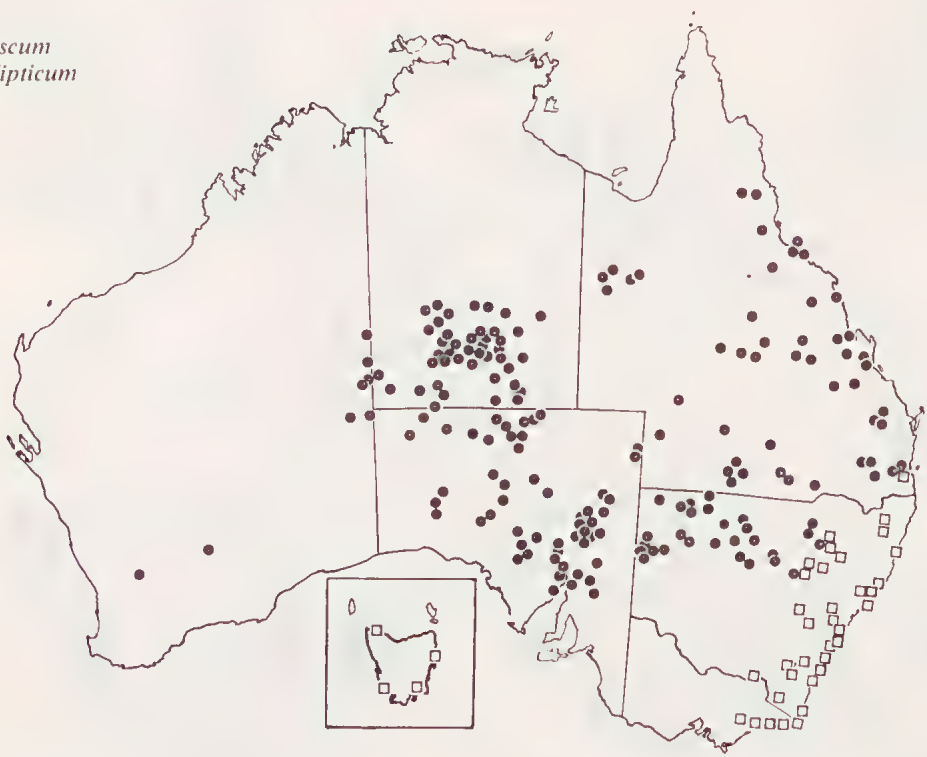








- *S. vescum*
- *S. ellipticum*

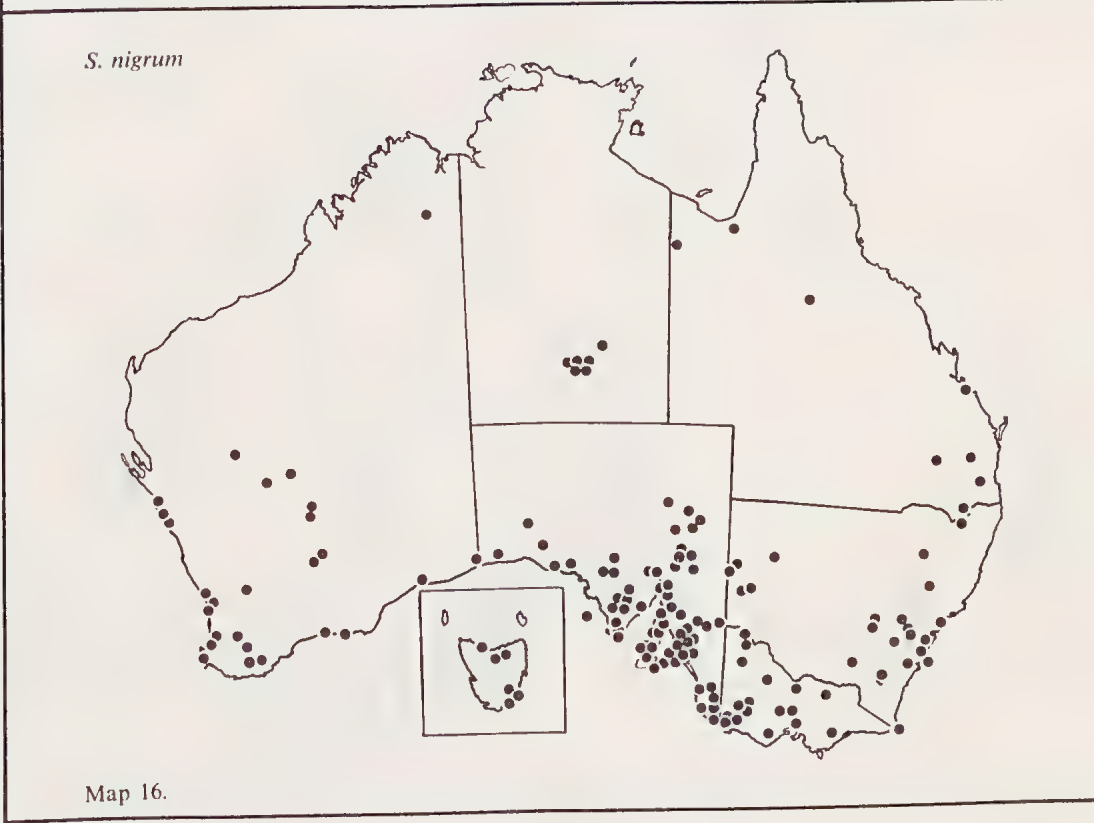
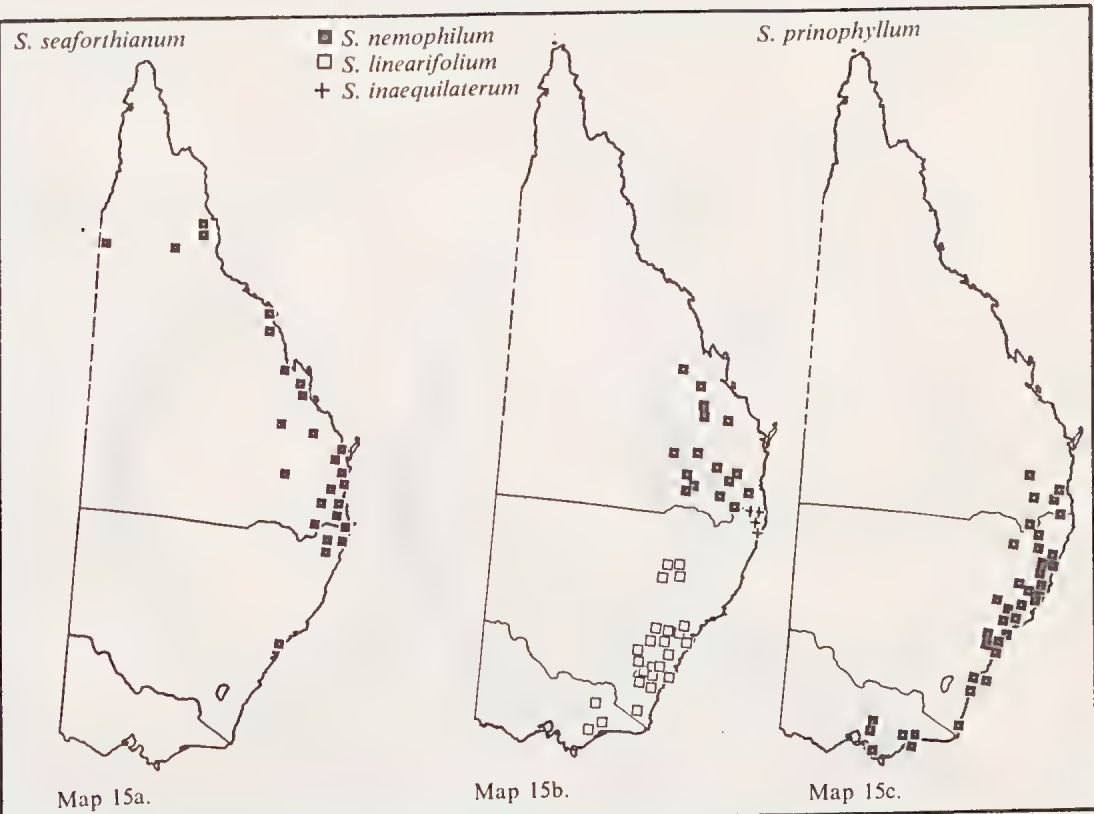


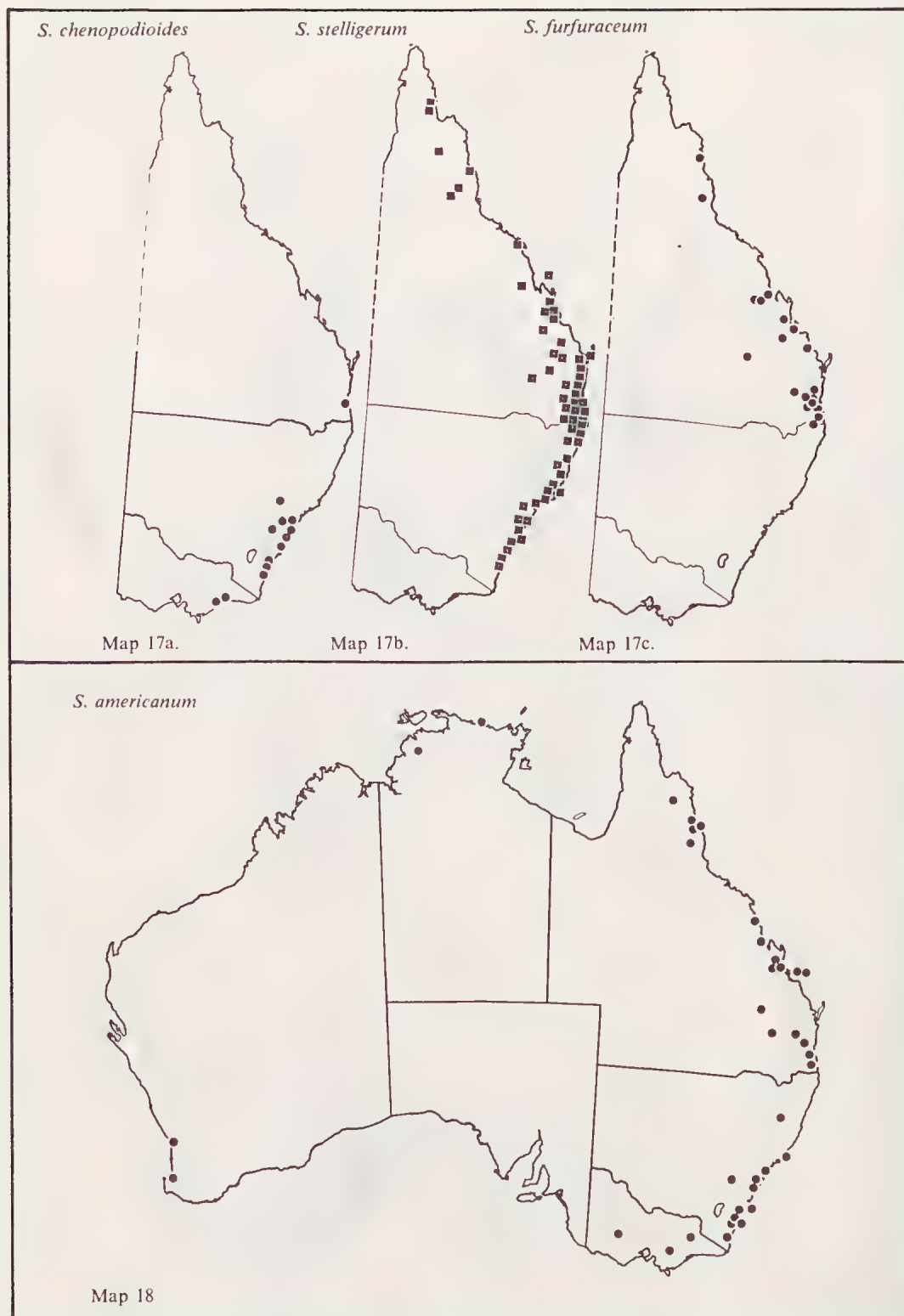
Map 13.

- *S. pseudocapiscum*
- *S. hispidum*



Map 14.









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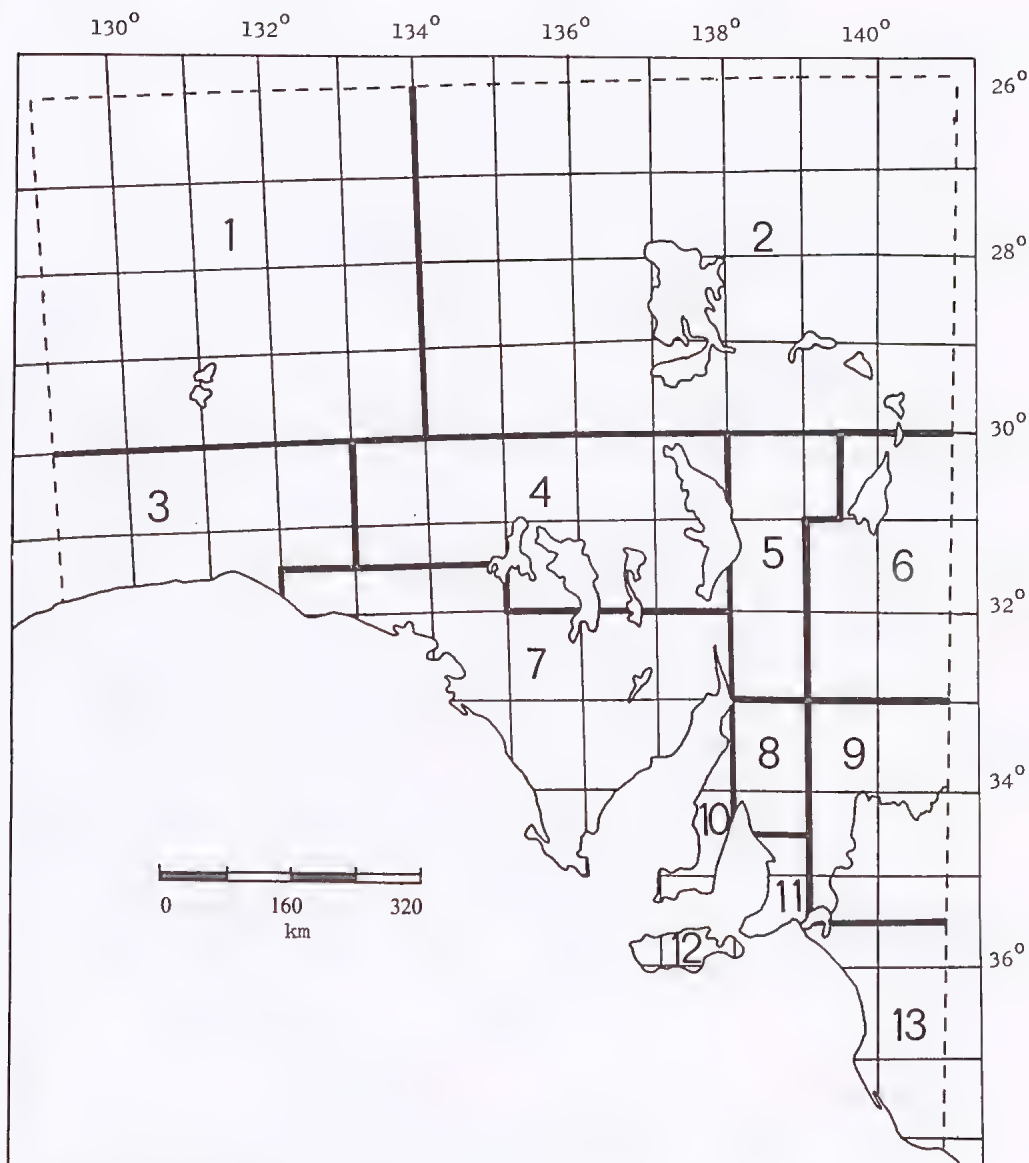
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- | | |
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| 2. Lake Eyre Basin | 9. Murray |
| 3. Nullarbor | 10. Yorke Peninsula |
| 4. Gairdner-Torrens Basin | 11. Southern Lofty |
| 5. Flinders Ranges | 12. Kangaroo Island |
| 6. Eastern | 13. South-eastern |
| 7. Eyre Peninsula | |



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